

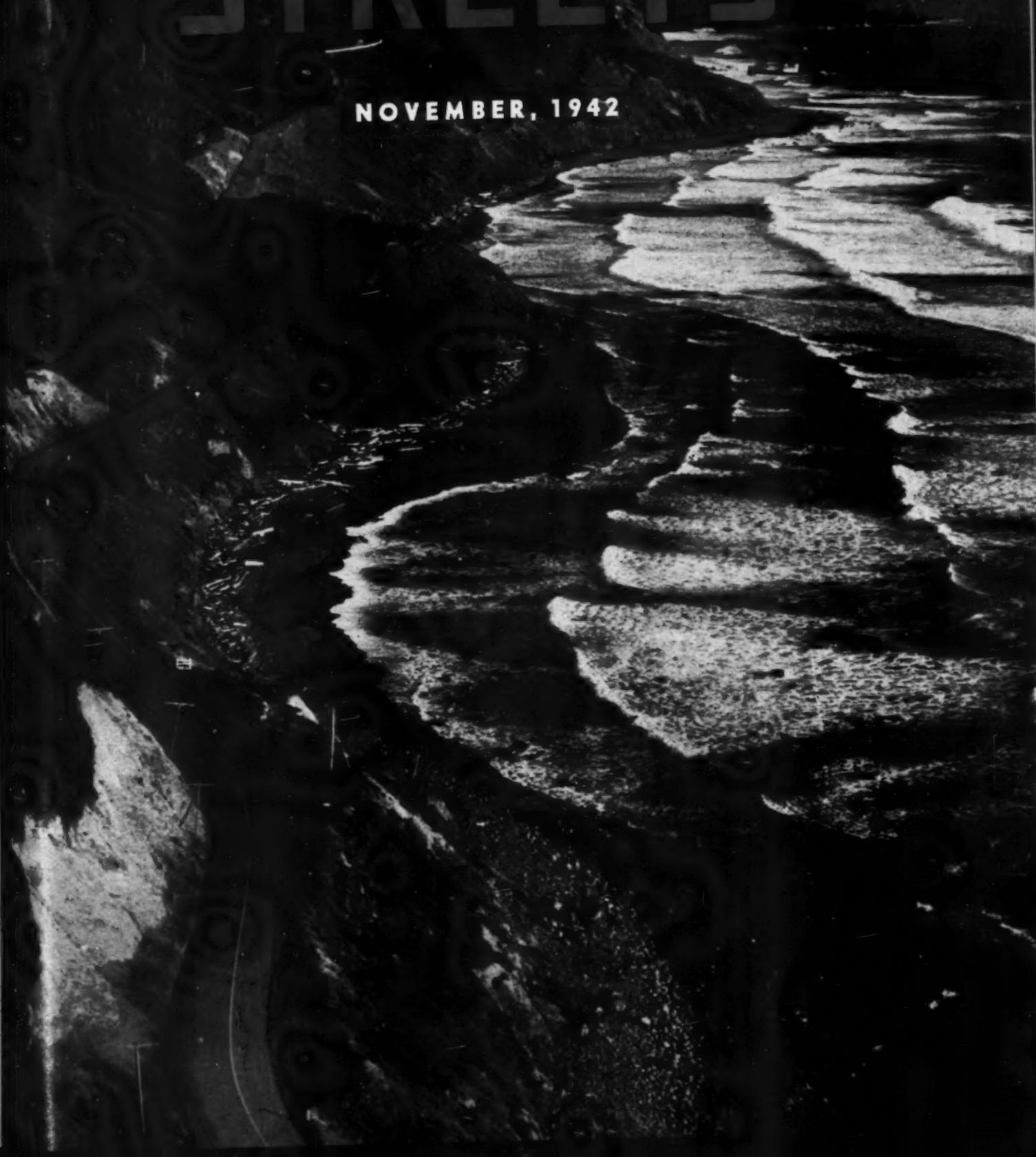
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ROADS AND STREETS

NOVEMBER, 1942



ADAMS EQUIPMENT HELPS TO GET OUR TANKS ROLLING



PHOTO BY U. S. ARMY SIGNAL CORPS



America is building, training and equipping an ultra-modern Armored Force to spearhead our attacks on world-wide fronts. In these vitally important preparations, Adams equipment has done much of the "ground" work . . . Earth has been moved and leveled for war factories to produce tanks, combat cars, trucks and guns; for ordnance and supply depots and training camps. Networks of access roads surround every factory, and every camp is getting its road system and vast motor parks . . . On all these jobs Adams machines have been and are helping to shorten the time table for Victory—to hasten the day when new, improved Adams equipment will again be available for your peace-time needs!

J. D. ADAMS COMPANY • INDIANAPOLIS, INDIANA

Adams motor graders, leaning wheel graders, elevating graders, bauling scrapers, tamping rollers, bulldozers and road maintainers are used by allied forces throughout the world.



● The Adams Heavy-Duty Motor Grader shown above is one of several at work building roads, motor parks, etc., in the United States Armored Force training school at Fort Knox, Kentucky—probably the largest training base of its kind in the world. The tanks shown above are on maneuvers with armored force trainees. The latest models, of course, are reserved for advanced training and combat duty.

TO KEEP YOUR EQUIPMENT ROLLING . . .

service and overhaul it regularly. See your nearest Adams dealer for new machines available under priority rating and for repairs and service on your present equipment . . . Wherever you are or wherever you go Adams co-operative service is near at hand.

ADAMS
ROAD-BUILDING AND
EARTH-MOVING EQUIPMENT



**Its great
highway network
helps America
wage war**

Americans may well be thankful that the coming of war and wartime traffic found their country in fortunate possession of the world's greatest highway system.

Our vast network of concrete-and-steel ribbons binds together the nation's war industries, raw-material sources, and commercial centers, helping enormously in the task of speeding the production and delivery of fighting equipment, and the movement of military forces and supplies.

Bethlehem's Road Products have been used extensively in the construction of the nation's concrete highways. Bethlehem Reinforcing Bars and Mats, embedded in the concrete, are preventing cracks and disintegration, despite heavy wartime loads. Bethlehem Road Joints are there, too, taking care of expansion and contraction of the pavement, transferring heavy loads from slab to slab, and keeping the riding surface smooth and even.

And Bethlehem's Safety Beam Guard Rail and Steel Highway Posts are on 24-hour-a-day duty, guiding traffic, helping to keep military convoys and war shipments rolling along fast and safe.



BETHLEHEM STEEL COMPANY

ROADS AND STREETS

Vol. 85, No. 11

November, 1942

CCA

A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations; and to the construction and maintenance of airports.

WITH ROADS AND STREETS HAVE BEEN COMBINED GOOD ROADS MAGAZINE AND ENGINEERING & CONTRACTING

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Published by Gillette Publishing Co. Acceptance under the Act of June 5, 1934, authorized January 26, 1938, at Chicago, Illinois. Subscription price \$3.00 per year in the United States, \$3.60 per year in Canada, \$4.00 per year for foreign mailing.

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GILLETTE PUBLISHING COMPANY

330 S. Wells St., Chicago, Ill.

ESTABLISHED 1906

PUBLISHERS OF
ROADS AND STREETS

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WATER WORKS AND
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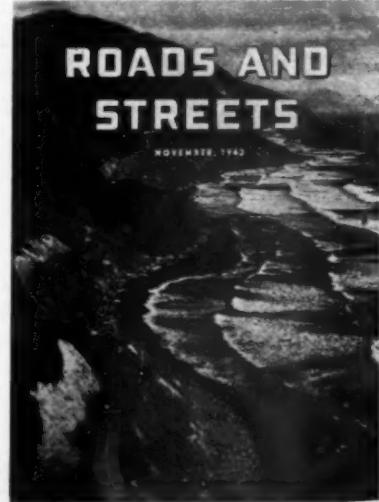
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(Ore. State Highway Dept. Photo)
Oregon coast highway skirts the Pacific near Port Orford

SOLD! and Delivered to HIROHITO, ETC. Without Priority—and Fast Delivery Guaranteed!

Yes, sold to Hirohito and his gang—and d... fast delivery guaranteed—even without priority.

Every contractor, county and municipality has obsolete equipment stowed away in hidden by-ways, in forgotten storage, in unused garages—most of it *big tonnage* stuff that has long since lost its value.

Mister, there never was a better time to get rid of those jalopies. Turn them into scrap now, and let's deliver them to the Axis in the form of bullets and bombs.

- You will be making a major contribution to the war effort by supplying tons of essential steel scrap.
- You will get rid of a lot of old unnecessary stuff and clear the way for the modern and more efficient equipment which manufacturers' research and development will have ready after the war.

How to make your scrap, scrap for you

Get in touch with your nearest Lorain distributor. He will be glad to help you turn your jalopies into bombs and can advise you on any parts of equipment which should be retained for replacement use on other machines.

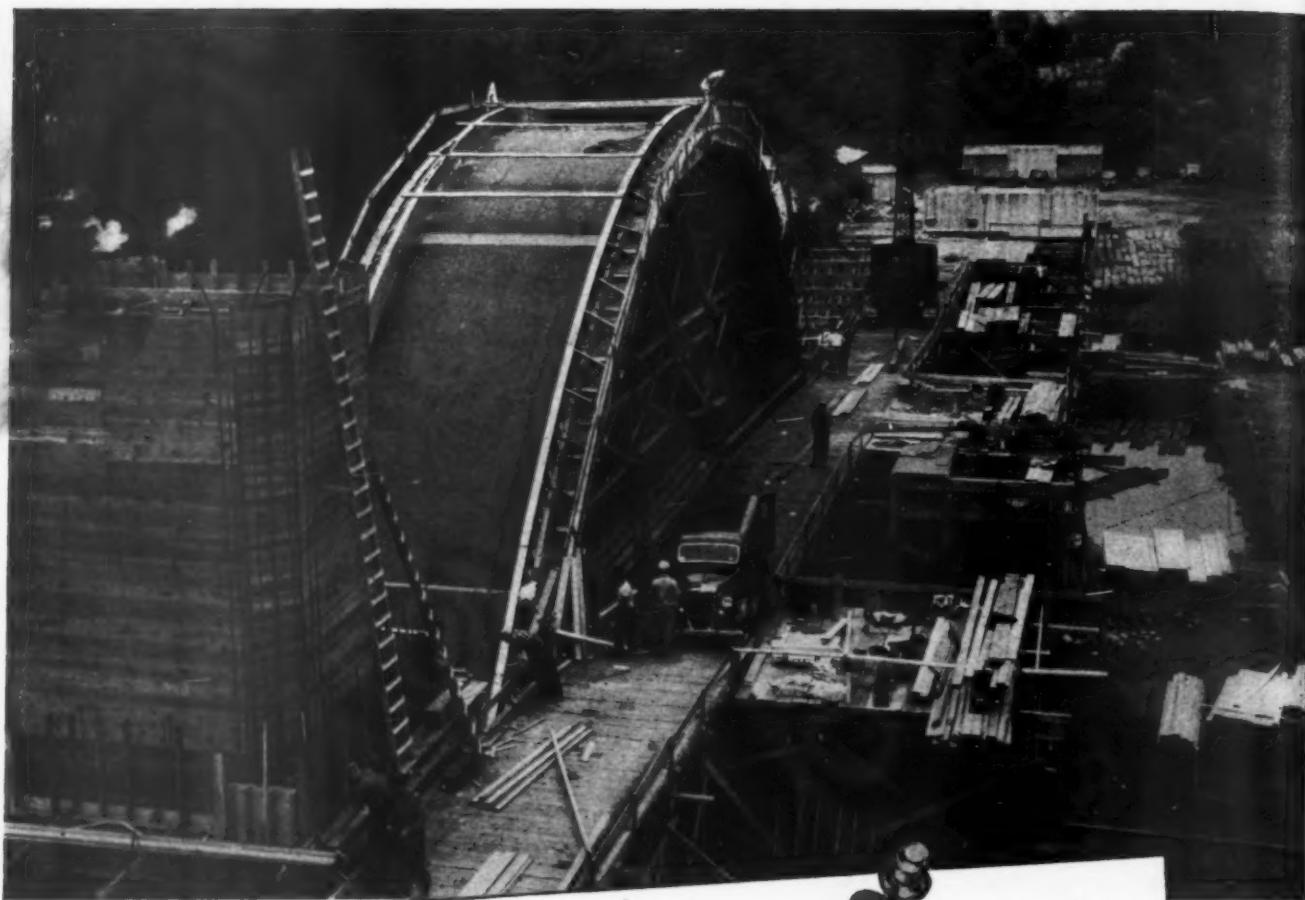
Then, too, he can help you do more with your present equipment because he has complete facilities for *rebuilding, repairing and servicing*. For rapid-fire action on today's problems and for the newest developments in shovels, cranes and draglines tomorrow, get acquainted with your Lorain distributor. He's on his toes.



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LORAIN, OHIO

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CRANES • SHOVELS
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A speedier job . . . lower maintenance costs
with Gulf Lubricants and Fuels in service!

"**R**IGHT at the start of this job, our equipment was checked over by a Gulf engineer, and the story of our benefits from the quality lubricants and fuels he recommended is written in our operating records," says the contractor on this bridge project.* "We have had no time-wasting mechanical delays, and have obtained efficient low-cost performance from every unit."

Here are the chief reasons why so many leading contractors standardize on Gulf products: Gulf lubricants have a well-deserved reputation for stability and toughness — they stand up and give full protection under varied service conditions. And Gulf fuels give top-notch performance. Result: efficient, trouble-free operation of equipment, long service life, and low costs for maintenance.

Make sure your equipment gets the operating benefits of Gulf's higher quality lubricants and fuels. They are quickly available to you through more than 1200 warehouses located in 30 states from Maine to New Mexico. Write or 'phone your nearest Gulf office today.

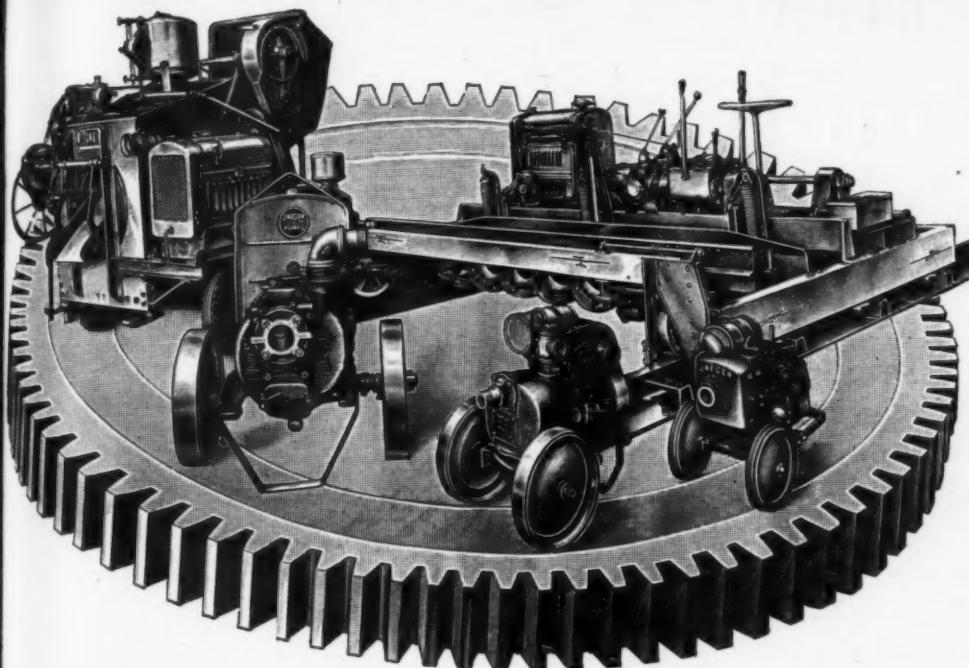


*Frank T. Wescott, North Attleboro, Mass., is the general contractor on this 925-ft. span bridge, which is part of the George Washington Highway by-pass at Providence, Rhode Island. Gulf lubricants and fuels have helped prevent delays and costly repairs.



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GULF REFINING COMPANY**
GULF BUILDING • PITTSBURGH, PA.

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- 1: YOUR GOVERNMENT HAS URGENT USE FOR ALL IDLE CONSTRUCTION EQUIPMENT. WE WILL BUY, RE-SELL OR REBUILD YOUR WORTHWHILE IDLE MACHINES.
- 2: TRAINED EQUIPMENT MECHANICS, with factory shop facilities, and a full stock of repair parts.
- 3: NEW JAEGER MIXERS, PUMPS, HOISTS, ROAD MACHINERY for any important job, as long as our stocks hold out.
- 4: EQUIPMENT FOR RENT to contractors to meet many needs and priority problems.

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IN OVER 100 CITIES
ARE "GEARED UP" FOR
WAR SERVICE



From mills that roar and screech

Until peace comes the wire rope mills of America must roar and screech by day and by night.

For without wire rope there would be only a dribble of iron ore, only a thin fleet of ore boats on the Great Lakes, only a starvation flow of steel from the smelters.

The wire rope manufacturers of

America are proud of their ability to produce; proud also that every mill makes Preformed Wire Rope for the hard action jobs. Preformed lasts longer, thereby saving precious time. It is safer, thereby reducing accidents.

But it also saves steel in a time when steel is vital.

Preformed wire rope

For the Action Jobs of Industry



ASK YOUR OWN WIRE ROPE MANUFACTURER OR SUPPLIER

ROADS AND STREETS, November, 1942

They, too, serve. . .



... WHO OPERATE AMERICA'S ESSENTIAL CIVILIAN SERVICES

In snow removal, in the operation and servicing of oil wells, in maintaining vital power and communication systems, in logging camps, mines, pits and quarries, the owners and drivers of Marmon-Herrington *All-Wheel-Drive* trucks are doing their part for the winning of the war.

They wear no smart-fitting uniforms, receive no citations, or distinguished service medals, yet their work is just as essential as the bearing of arms. No army is stronger at the front, than its support from

the rear. America needs us strong at home, too.

Russia's snows and thaws greatly aided Timoshenko's armies in stopping the Germans last winter. There must be no slowing up of America's war effort this winter because of snow-clogged roads or failing public utilities. Keep the extra-tractive power and maneuverability of your Marmon-Herrington *All-Wheel-Drive* trucks functioning at peak efficiency. Do not hesitate to write or wire our service department for any assistance or parts you may need.

MARMON - HERRINGTON

All-Wheel-Drive

MARMON - HERRINGTON CO., INC., Indianapolis, Indiana

Cable Address: MARTON



THIS WINTER, MORE THAN EVER, POSITIVE SKID PROTECTION IS VITAL

ROLLING WHEELS speed workers and raw materials to factories, finished parts to assembly points and implements of war to the armed forces. They must not skid on icy turns nor stall on slippery hills.

Give 'em traction, keep 'em rolling all winter by effective ice control, with abrasives that dig in and hold. Sand or cinders treated with calcium chloride dig into the ice — fast. Such treated abrasives do not freeze in stock piles, are ready for instant spreading. They go three times as far — stay

on the ice many times longer — combine highest efficiency with greatest economy.

Calcium chloride, the active agent which gives abrasives their ability to bite and hold steady, also gives them their fast action even at coldest temperatures.

Write today for Bulletin No. 27, "Skid-proofing Icy Roads and Streets." 36 pages give you data on ice control methods, materials and equipment. Get your copy now.

CALCIUM CHLORIDE ASSOCIATION
4145 Penobscot Building, Detroit, Michigan

CALCIUM CHLORIDE

FAST • POSITIVE • ECONOMICAL





GALION

ROLLERS and GRADERS

BUSY ON WAR PATHS

TURN
← LEFT

● Vital construction jobs . . . military highways, access roads, runways and aprons for airports, streets for housing projects . . . all war paths in a sense. All must be completed NOW. Machinery of all kinds is doing meritorious work . . . taking the brunt of the fighting on the home front. Galion road machinery is no exception . . . it continues to go all out in a war that was put up to industry at the very start.

THE GALION IRON WORKS & MFG. CO.

MAIN OFFICE AND WORKS: GALION, OHIO



Don't Neglect Asphalt Pavements!

A Universal Twin Dryer Portable Asphalt Plant Cuts Patching Time and Costs! . . .

It's important to keep asphalt pavements in good condition now when tires need road protection.

Though it may not be possible to resurface asphalt streets and roads to any great extent at this time, you can pave stretches that need repairs badly, and apply hot patches where needed with asphalt produced fast and at low cost the Universal "Twin Dryer" way!

This compact, portable plant does everything a big, stationary, "capital investment" asphalt producing plant does, but on a smaller scale. Sand and aggregates are thoroughly dried by the two rotating dryers. Hot asphalt is introduced under pressure. Thorough mixing and penetration are provided by the screw type pug mill. Easily towed from pit to pit or stockpiles. Set up ready to go in only a few minutes. Send for the facts in Bulletin No. 57.

Another "direct hit" is the Universal Spreaderoller — the cost-cutting, self-propelled, seal coating machine that spreads material in three layers and rolls it smooth and firm simultaneously. They are speeding airport apron and runway, and military road construction in the U. S. and Canada. The facts are all in Bulletin 800-A!

UNIVERSAL CRUSHER CO.
631 C Avenue, West
Cedar Rapids, Iowa

A User Reports
"We recently produced 42 tons of mixed asphalt per hour on a street job, under favorable conditions, using 10 to 11 gallons of MC-2 asphalt road oil, costing only a few cents per gallon, to one ton of aggregates." The Universal "Twin Dryer" will help to keep 'em rolling over inexpensively maintained asphalt roads.



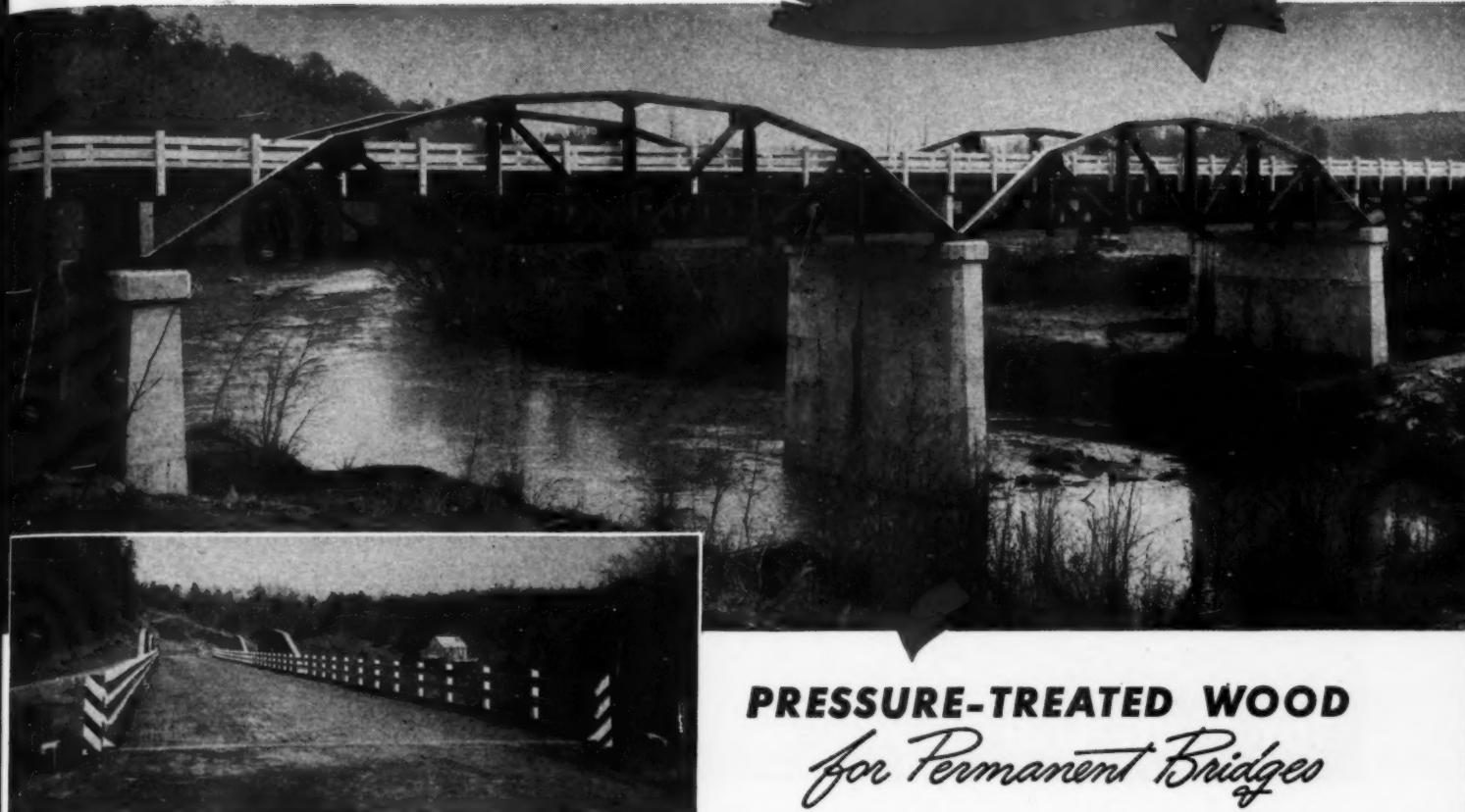
UNIVERSAL

CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS

FIRST IN

FIRST IN

WAR *Peace*



PRESSURE-TREATED WOOD
for Permanent Bridges

The Board of Revenue of Tuscaloosa County, Alabama, had the job of replacing a 332-ft. highway bridge. The picture above shows the result . . . a Pressure-creosoted Timber structure.

This bridge is designed for H-20 loading, is 33 ft. 6 in. wide overall, with a 24-ft. roadway. There are two 90-ft. half-through truss spans, and ten 15-ft. pile trestle approach

spans, supported on 4-pile bents. Teco connectors were used. The cost averaged only \$5.35 per sq. ft. of roadway.

Pressure-treated timber is the first thought of engineers for rush war-time construction but it is not an "emergency" construction material. It was the first thought of many alert engineers in peacetime as well. From '35 to '41, 72,699 bridges and viaducts were built in the

highway improvement program. Of these, 52,462—over 70%—are timber.

If you have a bridge or building problem, by all means check up on the record of Pressure-treated wood. You'll find it saves material costs, erection costs, and maintenance costs, while giving you a permanent, dependable structure. Ask for bridge bulletin, which gives data on typical installations.

KOPPERS COMPANY
WOOD PRESERVING DIVISION
PITTSBURGH • PENNSYLVANIA

use KOPPERS products

**QUIZ on application of
soil-cement
for light traffic war pavements**

When should soil-cement be considered?

Answer: The field of use of soil-cement includes low first-cost auxiliary and secondary airport surfaces, plane parking areas and taxiways, light-traffic military roads and streets, parking areas for army trucks and war workers' cars, road shoulders and widening.

What types of soil can be processed?

Answer: Soils on the site are usually satisfactory. Old gravel or stone roads containing 50% or more soil also can be successfully treated.

What engineering supervision is required?

Answer: Job control by a full engineering field force giving careful attention to details is essential. Simple, scientific procedures in both laboratory and field assure uniform results at any job speed.

What rate of construction can be planned?

Answer: Usually 5,000 to 10,000 sq.yd. daily; 10,000 to 20,000 frequently obtained; 350,000 sq.yd. in 19 working days reported for one job; 35,000 sq.yd. in peak day of 18½ hours on another. Rate of production may depend on ability to put competent engineers on the job, rather than on work crews and equipment. Speed is result of efficient organization of simple equipment and small crews of ordinary labor.

What material must be transported?

Answer: Generally just the cement and water. Soil-cement, being approximately 85 to 90% soil, requires little trucking or rail haul of materials. When borrow soils are occasionally used, short truck haul is common.



Call on our engineers for design and construction assistance on your soil-cement war projects.
Write for new laboratory handbook, "Soil-Cement Mixtures," mailed free in the U. S. or Canada.



PORLTAND CEMENT ASSOCIATION

Dept. 11-28, 33 W. Grand Avenue, Chicago, Illinois

BUY WAR SAVINGS BONDS AND STAMPS

ROADS AND STREETS, November, 1942

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They're Speeding The Biggest Task In History



"99-M" POWER GRADERS: Speeding coal and critical metals from mines to mills; constructing and maintaining vital highways; helping to complete airfields, camp sites, ordnance plants, and housing projects ahead of schedule.



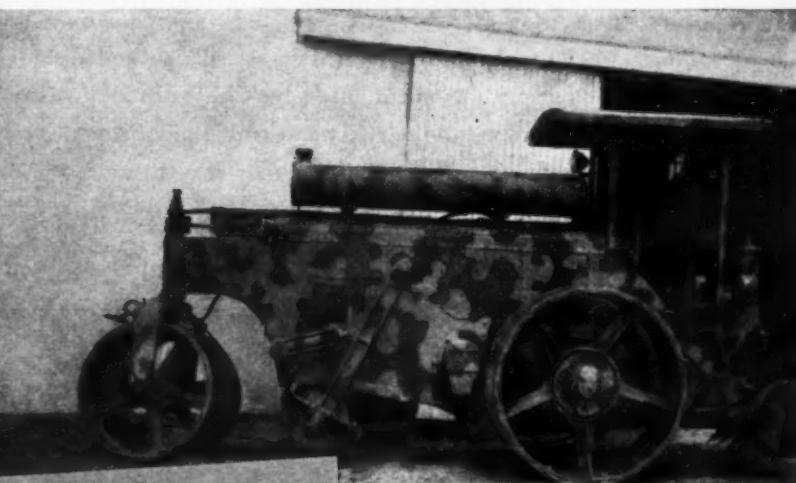
BADGER SHOVELS AND DRAGLINES: Meeting the time limit and manpower challenge by fast, consistent performance on airport and war plant construction; loading gravel and keeping materials moving at mines.



PATROL SWEEPERS: Hundreds of these nimble, efficient Sweepers are keeping runways and hangars clean and safe. Others are used to conserve time and manpower in and around industrial plants, warehouses and docks.

PORTABLE CRUSHING PLANTS: Operating at the job to supply stone, gravel, other materials essential to war construction; eliminating cross hauls, releasing transportation equipment, and conserving rubber.

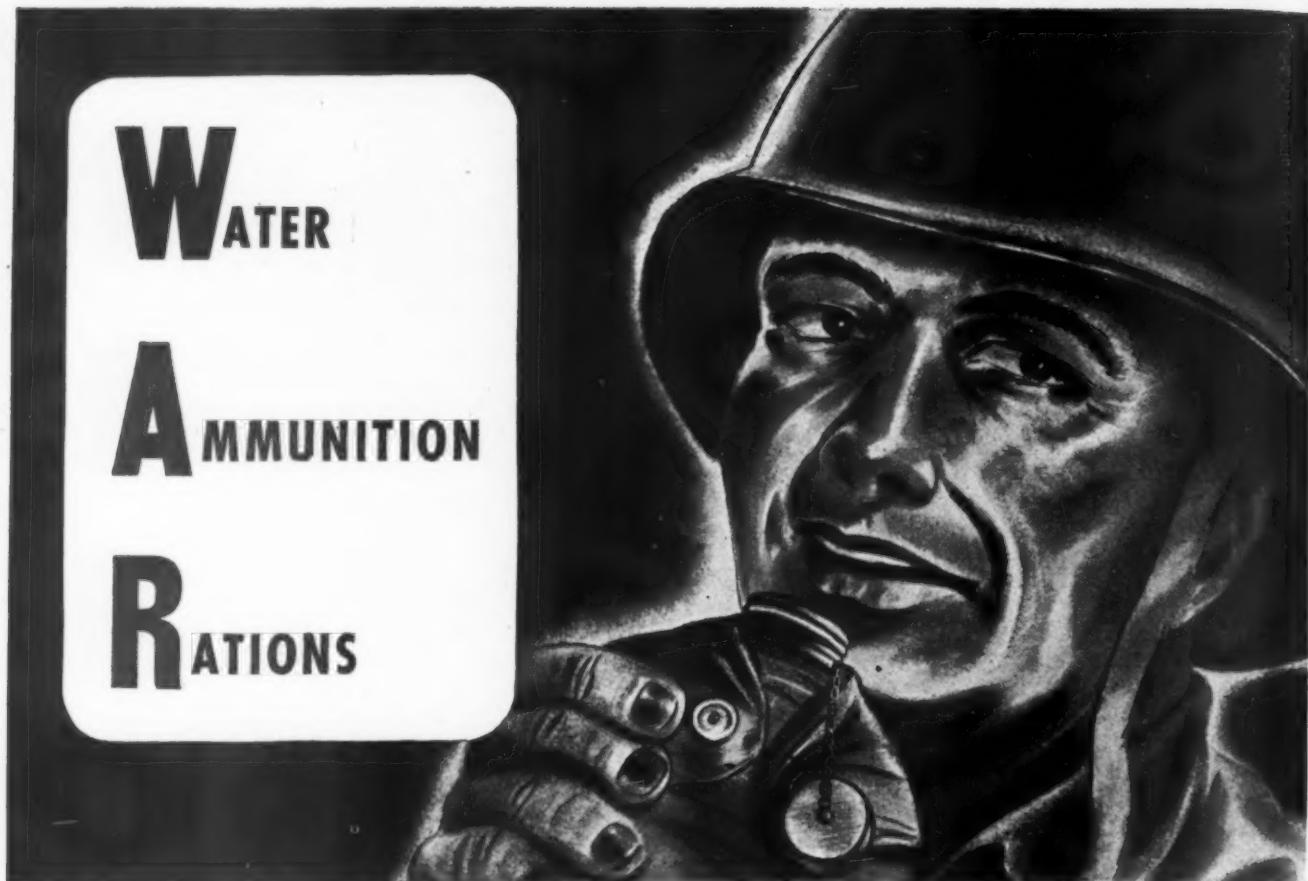
ROLLERS: Building vital roadways, airfield runways and Army Camp thoroughfares . . . and turning jungle trails into truck roads to reach new sources of critical war materials.



Austin-Western

THE AUSTIN-WESTERN ROAD MACHINERY CO., Aurora, Illinois

MOTOR GRADERS • BLADE GRADERS • ELEVATING GRADERS • SCRAPERS • CRUSHING AND SCREENING PLANTS • ROLLERS
ROLL-A-PLANES • MOTOR SWEEPERS • SHOVELS AND CRANES • SCARIFIERS • DUMP CARS • TRAIL CARS



**WATER
AMMUNITION
RATIONS**

**... PRIME NEEDS OF THE FIGHTING MAN — AND HOW
CLEAVER-BROOKS PRODUCTS HELP TO PROVIDE THEM**

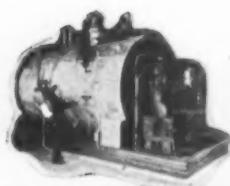
No matter where they are in action, American fighting men may be assured of safe drinking water, clear and sparkling, from even the most doubtful stream or other source by means of Cleaver-Brooks portable water distilling units.

Portable shower bath units, sterilizing and disinfecting equipment made by Cleaver-Brooks, also contribute to the safety and sanitation of America's fighting forces, wherever they may be stationed.

Cleaver bituminous boosters and tank car heaters, too, play an important part in the swift construction of military roads, airports and runways—pro-

viding fast, efficient heating of bituminous material in tank cars and storage tanks promptly as needed. On the home front in hundreds of industrial establishments, Oilbilt steam plants are providing steam for power and processing—helping to meet record-breaking production schedules for war equipment. Known for their efficient application of the multi-pass, down-draft, heating principle with America's ideal fuel — oil — Cleaver-Brooks products, now manufactured for a nation at war, will resume their peacetime service when Victory day comes.

CLEAVER-BROOKS COMPANY
5106 North 33rd Street • Milwaukee, Wisconsin



Oilbilt
STEAM PLANTS

Cleaver
BITUMINOUS BOOSTERS...TANK CAR HEATERS



CLEAVER-BROOKS COMPANY • MILWAUKEE, WISCONSIN

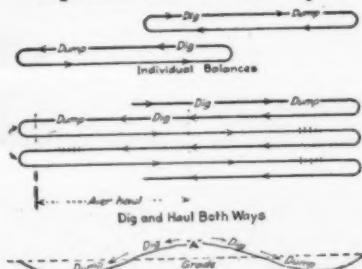


Convert Turning Time Into Extra Yardage and Extra Profits

Get More Loads in Less Time with Your Present Equipment by Using These Victory-Speeding Cut-and-Fill Methods

The two job-proved methods shown here are applicable on almost every airport, access road, base or other Victory project requiring earthmoving. By applying them you reduce round-trip time, consequently increase the number of loads and yardages you can move with your present Tournapulls and tractor-drawn LeTourneau Carryall Scrapers.

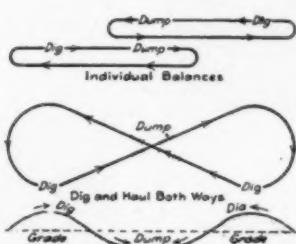
Spread Cut Two Ways



When this cut is worked in individual balances, 2 turns are required for each load. By cutting both ways and spreading at both ends, you handle 2 loads with but 2 turns.

Move Both Ends to Middle

Here again you save time by moving 2 loads with 2 turns instead of 4.



Each turn eliminated gains an average of 0.25 min.

Assume a 10 pay yard load and 5.0 min. per load, then on the basis of individual balances you could deliver 120 cu. yds. hourly. With either of the above turn-eliminating cycles, you save 3.0 min. on 12 loads, thus increase your hourly yardage to 126 cu. yds.—a gain of 126 cu. yds. per Carryall Scraper per 21-hour

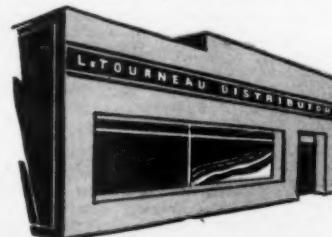
Heaping loads increase the yardage gains these LeTourneau Carryall Scrapers get for Coggins & Deermont, Chipley, Florida, contractors, who work this cut both ways and spread at either end as shown in Fig. 1.

day. At 15c a cu. yd. this elimination of turns amounts to \$18.90 per day or \$9,000 on a 10,000-hour operating life!

Figure the gain in yardage and extra profit for your own Carryall Scraper fleet and job—gains will vary with scraper size and haul distances, but you'll find the method always increases the number of loads and yardage—without an increase in equipment.

SEE YOUR LeTOURNEAU-“CATERPILLAR” DEALER

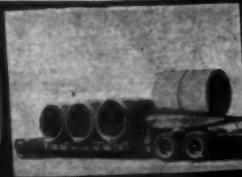
Any time you need help on job planning ideas for getting maximum yardage and lowest costs with LeTourneau equipment, call on your local LeTourneau-“Caterpillar” dealer. He also has parts and factory-trained servicemen to keep your equipment working at full efficiency for Victory. See him TODAY!



LETOURNEAU
PEORIA, ILLINOIS • STOCKTON, CALIFORNIA

Manufacturers of DOZERS, CARRYALL® SCRAPERS, POWER CONTROL UNITS, ROOTERS®, SHEEP'S FOOT ROLLERS, TOURNAPULLS®, TOURNAROPE®, TOURNATRAILERS®, TOURNAWELD®, TRACTOR CRANES. *Name Reg. U. S. Pat. Off.

**When BIG LOADS
are MOVED—
ROGERS TRAILERS
are PROVED**



ROGERS BROTHERS CORP.
110 Orchard St., Albion, Pa.



Cut
**YOUR
MIXING
Costs**

Modern bituminous mixing equipment is essential in meeting short time limits on many defense projects, but the production of this equipment is necessarily limited.

While this company's facilities are being used entirely in the war effort, a limited number of bituminous plants for defense purposes are available.

WE INVITE YOUR INQUIRIES.



Hetherington & Berner Inc.

ENGINEERS AND MANUFACTURERS
5111 KENYON AVENUE
INDIANAPOLIS INDIANA

MICHIGAN mobile SHOVELS deliver High Yardage at Low Cost



Learn how MICHIGAN mobile SHOVELS could help make your jobs pay bigger dividends — write TODAY for Bulletin S.

MICHIGAN American Mobile Shovel-Crane Specialists
MICHIGAN POWER SHOVEL CO.
BENTON HARBOR MICHIGAN

Soil Stabilization

By V. J. Brown
Publishing Director
ROADS AND STREETS

C. A. Hogentogler
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U. S. Public Roads
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SOIL STABILIZATION

This book is reprinted from a series of articles published in ROADS AND STREETS. Demand for the series was world wide. The book treats of fundamentals of soils mechanics and soil stabilization such that the average engineer can get a complete understanding of this new branch of highway engineering.

Profuse illustrations tell more than words could.

141 pages—Hard binding.

• Price, \$2.00 Plus Postage

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OUR FLAGS

Old Glory—symbol of our democracy—of the freedom it guarantees—of the goal it struggles toward—of ideals it embodies—of sacrifices, by others, for us. ★★ Our Service Flag—our fellow workers, on the battle front. ★★ The Minute Man—our share in financial support of their effort. ★★ The Army-Navy "E"—awarded the employees of Barber-Greene for efficiency in production. ★★ We are proud that machines developed by us for the enrichment of our peacetime way of life, may now serve so effectively in our country's defense. ★★ We of Barber-Greene pledge our continued effort to "keep them flying."

BARBER-GREENE COMPANY
AURORA, ILLINOIS, U. S. A.

Buy United States

War Bonds- Stamps

Barber-Greene Bituminous Central Plant

Similar to equipment now being built by Barber-Greene Company for U. S. Army, Corps of Engineers



SWING IT for VICTORY

The output of any shovel depends on the operator's "know how." Check your shovel performance with the list below and perhaps you'll find a point or two that will help. We all want to win this war the quick way . . . let's go!

- 1 Keep the swing short . . . spot trucks in close.
- 2 Cut a thin slice up along face so the dipper comes up fast and easy. Don't overcrowd!
- 3 Keep dipper teeth sharp.
- 4 Set pitch braces for fast digging. Angle of teeth should usually match average angle of bank.
- 5 Keep your friction clutches tight. You can't dig fast with a sloppy clutch adjustment.
- 6 Loosen the bank while you wait for trucks.
- 7 Overlap your cycle . . . have dipper at right height for dumping when it swings over truck; swing and lower; come in crowding.
- 8 Move up often, work your bank close.
- 9 Steady does it — keep 'em swinging.



Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN

Enlarged reprints of this ad are available for your bulletin boards. In the reprints, the Bucyrus-Erie signature is omitted to leave room for your own name. Write for your copies.

ROADS AND STREETS, November, 1942

"THAT SEAMAN PULVI-MIXER IS AN ABSOLUTE 'NATURAL' FOR SOIL-CEMENT!"



Contractors the country over are finding that the sharp increase in military airports and access roads has placed soil-cement in the very front rank as a quick and economical type of construction — one readily engineered to meet the requirements of each particular project. While the SEAMAN PULVI-MIXER is not by any means limited to soil-cement, it is a perfect "natural" for the process. The SEAMAN offers precision control in the processing of materials — and — especially important — in governing moisture.

Any soil stabilization job, with or without binder, is fitted to SEAMAN performance — but we urge the alert contractor to investigate NOW — the possibilities of the SEAMAN PULVI-MIXER in soil-cement construction.

The SEAMAN PULVI-MIXER is a fast, efficient, thoroughly proven piece of equipment that often repays its investment plus a good substantial dividend, even before a job is completed. That the profit comes in time and labor saving, is a vital fact in these days of tight operational schedules and man-power shortages.

SEAMAN Engineers have prepared,— after months of study,— a comprehensive Bulletin on the soil-cement process. It's packed with up-to-the minute information and loaded with construction hints. It's yours for the asking. Write — (and do it now) to

SEAMAN MOTORS

305 N. 25th STREET • MILWAUKEE, WIS.



INDEPENDENT Boom Control

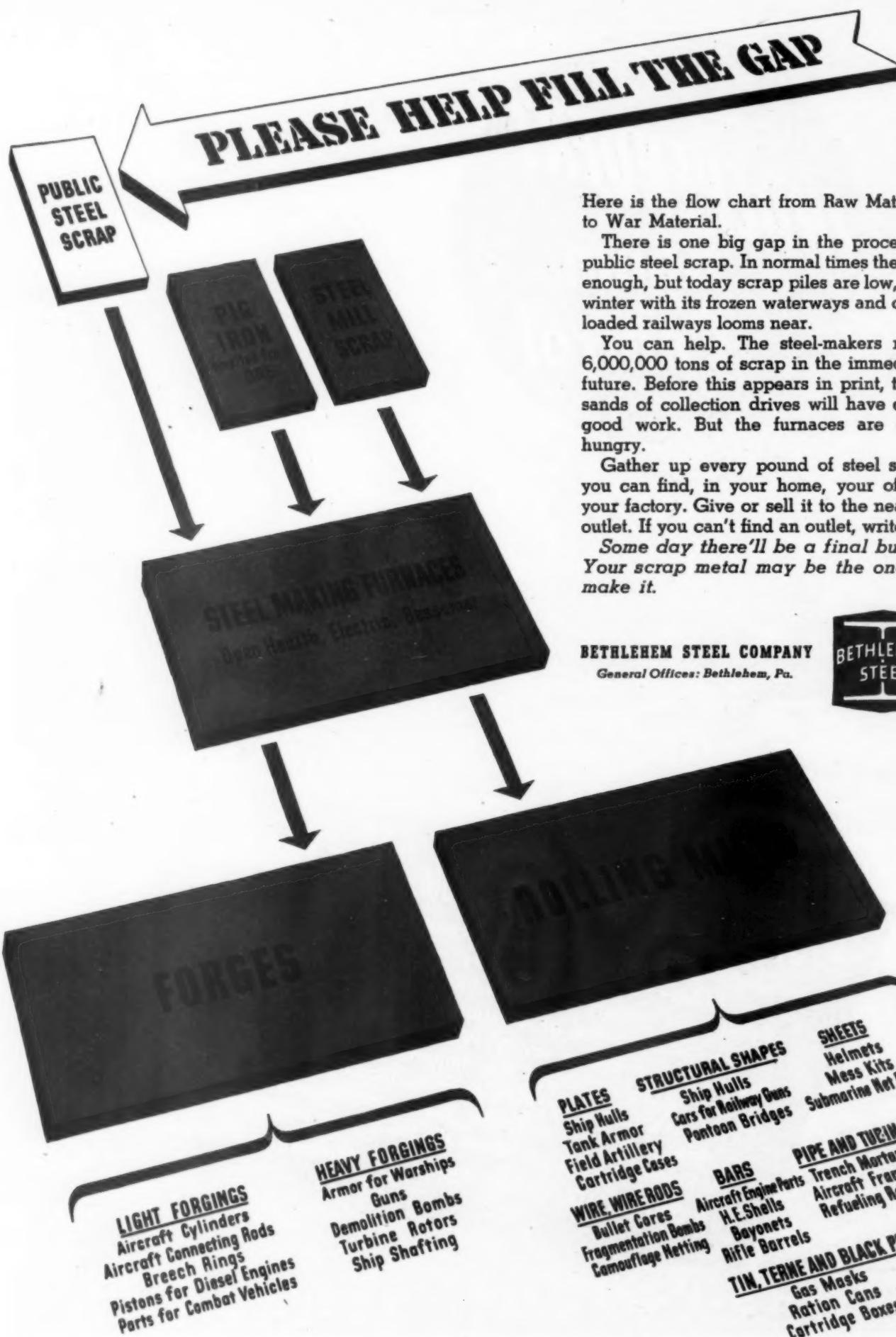
HOIST THE LOAD, RAISE THE BOOM, WHILE SWINGING

Independent boom control saves seconds on material handling work. Independent boom control permits accurate spotting of forms and buckets. Hoisting while swinging or traveling saves more seconds. Raising or lowering the boom while swinging saves traveling is a second-saver. With Koehring Cranes on the job waste motion is reduced to a minimum. Every move is a productive move...be it traveling, hoisting, loading or unloading, spotting buckets, steel or forms. The many time-saving advantages of Koehring means speed on the job...more production per hour.

KOEHRING COMPANY • Milwaukee, Wisconsin

HEAVY-DUTY CONSTRUCTION EQUIPMENT





Here is the flow chart from Raw Material to War Material.

There is one big gap in the process—public steel scrap. In normal times there is enough, but today scrap piles are low, and winter with its frozen waterways and over-loaded railways looms near.

You can help. The steel-makers need 6,000,000 tons of scrap in the immediate future. Before this appears in print, thousands of collection drives will have done good work. But the furnaces are ever hungry.

Gather up every pound of steel scrap you can find, in your home, your office, your factory. Give or sell it to the nearest outlet. If you can't find an outlet, write us.

Some day there'll be a final bullet. Your scrap metal may be the one to make it.

BETHLEHEM STEEL COMPANY
General Offices: Bethlehem, Pa.



Sudden Death
TO SNOW DRIFTS!

WALTER
 FOUR-POINT POSITIVE DRIVE
**SNOW
FIGHTERS**

ANY snow plow can take an "average" snow-fall in stride. But it's the raging blizzards and towering drifts that cause tie-ups and put your snow removal equipment to the supreme test.

Walter Snow Fighters are designed for drift-busting and do their stuff in the toughest snow country of America and Canada. No drifts are too deep, no snows too heavy, no surfaces too slippery for the tremendous power-plus-traction of Walter 4-Point Positive Drive.

This great all-wheel drive system reveals the most advanced engineering . . . automatic lock differentials which deliver the power to each wheel according to its traction at any instant . . . suspended double reduction drive for larger gear capacity and higher ground clearance . . .

tractor type transmission with 6 speeds forward, 2 reverse . . . powerful gasoline or diesel motors . . . correct weight distribution — and many more. Write for detailed literature.

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 1001-19 Irving Ave., Ridgewood, Queens, L. I., N. Y.

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FOR WALTER TRUCKS**

Consult your local Walter Distributor for expert repair service and genuine parts to keep your Walter Trucks in top running condition.



**EVEN SIDEWALK SUPERINTENDENTS
KNOW A GOOD BUCKET WHEN THEY SEE IT**

Of course they judge on how quickly it buries itself for a big pay load, how it swings without spilling, to dump smoothly and cleanly into the waiting truck. They don't know, as the contractor's superintendent does know, how long Williams Buckets last with little maintenance expense, and how well they deliver on the toughest hardpan jobs or handle rubble or concrete chunks.

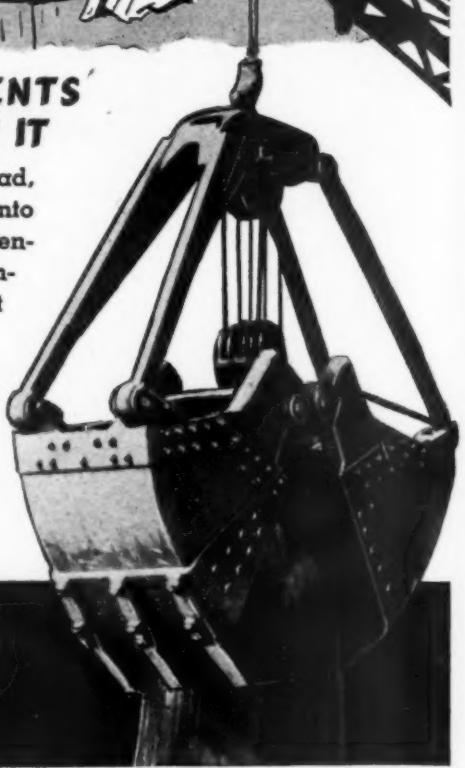
THE WELLMAN ENGINEERING CO., 7003 Central Ave., Cleveland, Ohio

WELDED
ROLLED STEEL CONSTRUCTION
for GREATER STRENGTH and SPEED

If you want the engineering reasons why it will pay you to make your next bucket a Williams, send for descriptive bulletins.

Distribution is all parts of the country.

WILLIAMS Buckets
built by WELLMAN



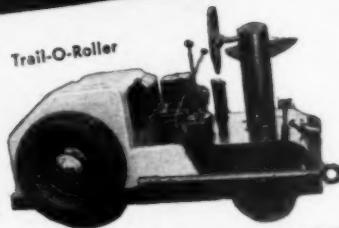
THESE UNITS WILL KEEP
ROADS AND AIRPORT RUNWAYS OPEN



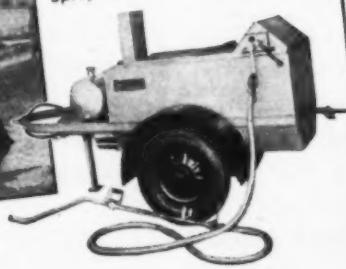
Roads and Airport Runways are vital today in our War Effort. Let's keep them open by using Black Top Equipment designed to give Speed in construction and maintenance plus 100% Efficiency in operation. Let Littleford Black Top Equipment do the ground work for Victory.



No. 101
Utility Spray Tank



Trail-O-Roller



84-HD Kettle
with Hand Spray



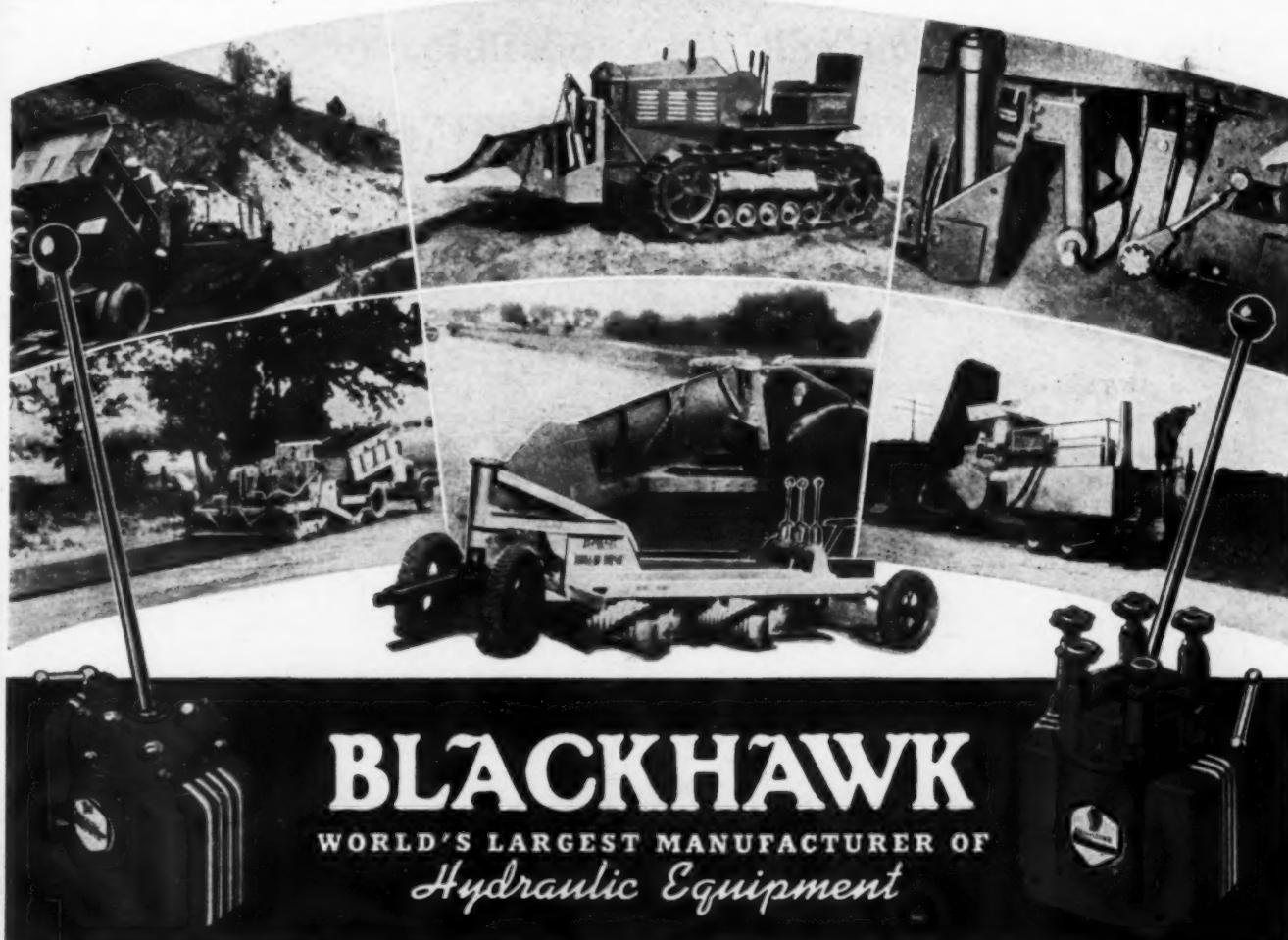
LITTLEFORD

LITTLEFORD BROS., INC.
454 E. Pearl St., Cincinnati, Ohio

MORE YEARS OF SERVICE IN BLACKHAWK POWER-PACKERS

You're all set to meet the extra demands of the times if your snow-plows and other road machines are equipped with Blackhawk Hydraulic Rams and Power-Packer Hydraulic Controls. They were built for years of dependable lifting power, speedy action, efficiency and accuracy. Give 'em proper care, service 'em right and they'll carry on "good as new" for years. Before winter sets in, be sure to refill all pump units with Blackhawk Winter Oil No. 71—(under no circumstances should brake fluid or other substitutes be used). Check over all units now—and if minor repairs are needed, write for name of nearest Blackhawk Authorized Service Station where you may secure necessary repair parts.

A Product of **BLACKHAWK MFG. CO.**, Dept. RS, Milwaukee, Wis.



HELP THE WAR EFFORT ... AND YOURSELF

HERE'S HOW!

- Estimate your future asphalt needs accurately.
- Let contracts for only the amount you will use.

UNLOAD TANK CARS PROMPTLY... "KEEP THEM ROLLING"

HERE'S WHY!

- The need for airports, cantonment streets, and highway construction and maintenance make asphalt a vitally important material to the war effort.

So far there has been no serious asphalt shortage generally. But in some instances work has been delayed on vital war jobs because asphalt could not be made immediately available. Stocks in suppliers' hands were held under contract. In many instances the municipal, state, or county department with which these contracts were made had greatly over-estimated its needs. Time was consumed in finding this surplus asphalt and getting releases for it.

● Release, now, any asphalt held for you by your supplier which you cannot use.

● Anticipate delivery schedules as closely as possible.

Read the suggestions at the top again. When you contract for 1943, estimate your asphalt needs accurately so that you will not hold up important war construction jobs. At the same time you will help insure that your own asphalt requirements will be met by your cooperation in this effort. You'll find the Standard Oil Asphalt representative in your locality eager to work more closely than ever with you on problems of delivery, types of construction, etc. Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Illinois, for the representative nearest you.

OIL IS AMMUNITION . . . USE IT WISELY

**ASPHALT FOR
EVERY PURPOSE**

**STANDARD OIL COMPANY
(INDIANA)**

ROADS AND STREETS

November, 1942, Vol. 85, No. 11

The Modern Equipment and Garage Set-Up of Winnebago County, Wis.

CLOSE to the city limits of Oshkosh, Wisconsin, stands the Winnebago County highway garage—a yellow brick building of some 25,000 square feet ground area and an upper story of 1,900 square feet—where about \$250,000 worth of trucks, tractors, road machinery, snow plows, etc., are housed, maintained and repaired.

The major items of equipment are:

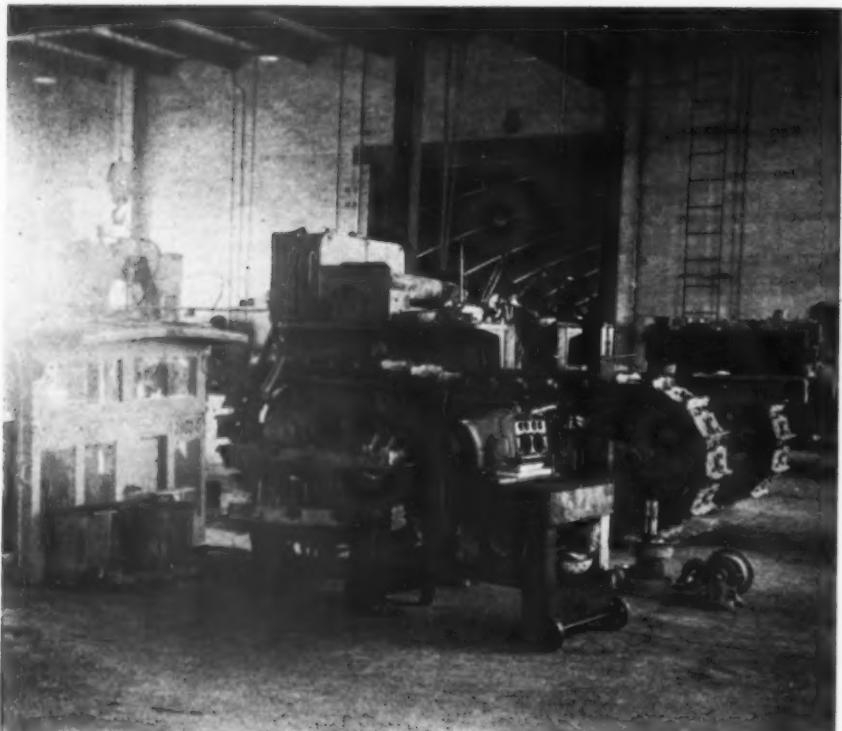
- 17—Oshkosh 4 wheel drive trucks (5-to 10-ton) equipped with snow plows.
- 8—Trucks (1/2 ton to 1 1/2 ton)
- 4—Crawler tractors, equipped with snow plows
- 11—Power graders, equipped with snow plows
- 3—Scrapers (7-yd., 10-yd., 15-yd.)

TABLE I
ROAD MILEAGES MAINTAINED BY WINNEBAGO COUNTY

| | Concrete | | Concrete- Black Top | | Total |
|---|----------|-------|------------------------|-------|-------|
| | Concrete | Miles | Black Top | Miles | |
| Federal and State Highways (main- tained by contract)..... | 120 | 15 | 3 | .. | 138 |
| County Highways | 44 | .. | 155 | 85 | 284 |
| Town Roads (maintained by con- tract) | .. | .. | 49 | 417 | 466 |
| Total | 164 | 15 | 207 | 502 | 888 |

- 1—Bituminous distributor (800 gal.)
- 1—Gasoline tank truck—Dodge (1200 gal.)
- 1—Bros tank car heater on 3-ton International truck
- 1—Koehring 3/4-yd. gasoline shovel
- 1—Koehring mud jack
- 5—Tar kettles
- 1—Galion roller (8- 10-ton)
- 4—Ohio mowers
- 1—Hi-Way trailer (30-ton)
- 1—Air compressor on truck
- 60—Miles (approx.) Wheeler - Arnold snow fence





Tractor being overhauled for Uncle Sam



Shop machines are ranged in front of large windows



As indicated by the large number of plows and the 60 miles of fencing, Winnebago County lies in the famous Wisconsin snow belt—a fact which adds materially to the amount of equipment required and to the cost of maintaining the highway system.

County, State and Township Roads Maintained

The road system, cared for by the County Highway Commission, totals 888 miles, of which 284 miles are County roads, while 604 miles are State (including Federal routes) and Township roads, maintained by the County under contract. A summary of this mileage is given in Table I.

The 138 miles of Federal and State highway are divided into five maintenance sections, ranging from 21 to 30 miles in length; while the 284 miles of County road also has five sections, with lengths from 13 to 95 miles. The Township roads are maintained by the County crews through orders from the Town Chairman, and are not sectionalized for maintenance. An hourly rental rate for machine, operator and helper is charged for this Town service for State and Federal route maintenance, payment is made to the County by the State Highway Commission on the basis of monthly reports showing materials used and the time of men and machines.

An incidental item of Township-County cooperation is the fire truck owned jointly by four of the Townships. It is kept at the County garage, and manned by County men at a flat rate of \$50 per month.

The year-round crew for all of this work comprises 60 men, as follows:

- 1—Road superintendent
- 10—Patrolmen
- 43—Truck drivers, tractor operators, grader operators and patrolmen's helpers
- 1—Shop foreman
- 4—Mechanics
- 1—Mechanic's helper

Roadside Parks

One of the jobs of which the County Highway Department is justly proud has been the laying out and landscaping of some thirty odd parks (most of them triangular) at road junctions, crossings, and similar locations, and especially at points where bits of land have been left over after highway relocations. These areas are levelled off and seeded; flower beds are put in and shrubs planted; and in the larger parks picnic tables and benches are installed for the convenience of motorists. This treatment serves the three-fold purpose of increasing safety by providing better traffic layouts,

improving appearance, and affording a recreational convenience. The cost of labor (but not materials) used in developing these parks on State and Federal highways is paid by the State Highway Commission.

Garage Building and Equipment

The equipment storage section of the garage measures 80 x 209 ft. It has a laminated arch rib ceiling, along the center of which are mounted several unit heaters which keep the quarters at practical working temperatures at all times. The shop is 80 x 80 ft. and includes a 20 x 26-ft. cleaning and spray room with special exhaust system and lighting as shown in the picture.

The front portion of the building, 80 x 24 ft., is two stories high. It is occupied on the first floor by office, locker room, wash room, etc., and on the second by the sign shop and a club room for the men.

Sandsteadt and Knoop, of Oshkosh, were architects for the entire structure. Flour Brothers, of Oshkosh, built the storage section in 1938, while W. C. Smith, Inc., of Milwaukee, erected the office and shop portion in 1940.

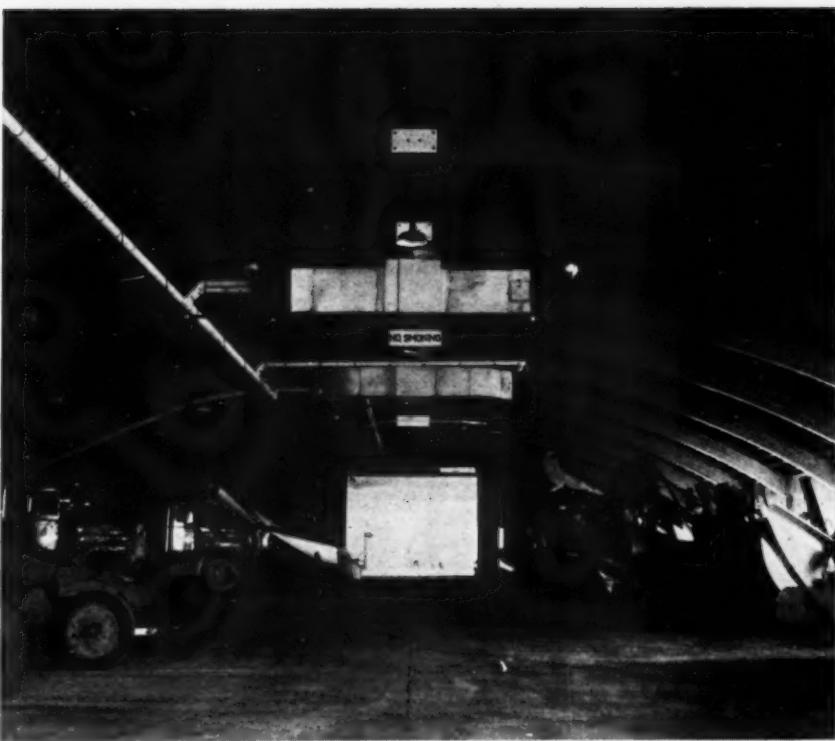
Major shop equipment includes the following:

- 1—16-in. Prentice lathe
- 1—3-in. Niles-Bennet drill press
- 1— $\frac{3}{4}$ -in. Rockford drill press
- 1—Large 123 Ramson grinder
- 1—Smooth Arc 200 amp. Hansen welder
- 1—Champion forge
- 1—200-ton Goodyear press
- 1—Brunner air compressor
- 1—28-ton Illinois press
- 1— $\frac{1}{2}$ -in. Walker-Turner drill press
- 1—Walker-Turner grinder
- 1—Curtis compressor

In the picture at the top of the page opposite is one of the County's tractors—a Caterpillar RD8—being overhauled prior to delivery to the U. S. Government, for use presumably in Alaska. This machine was new in 1936, and has had one previous overhaul. Now, after a total of 3132 hours of service, it is getting new pistons, new sleeves, a new master clutch, and two new idlers. For the rest, it is being thoroughly cleaned and refinished.

The Winnebago County highway system, the garage, and all work done by the County highway forces are under jurisdiction of E. M. Bird, Highway Commissioner. William Gamache is foreman in charge of equipment maintenance.

Gasoline and tire rationing during the months of May and June caused a 40 per cent slash in traffic and in revenues on New York City's five great arterial bridges. Bridges involved are the Triborough, Bronx-Whitestone, Henry Hudson, Cross Bay Parkway and Marine Parkway.



Storage section of garage, looking toward the shop

The spray room is well lighted and ventilated



Federal Rulings on the Use of Bituminous Materials

RULINGS and interpretations of Federal requirements concerning the use of asphalt and tar products on roads and highways have clarified the procedure to be followed in applying for materials in special cases.

Recommendation No. 45 issued by the Petroleum Coordinator for War on April 24, 1942, restricted the use of asphalt and tar on highways in 17 Atlantic Seaboard States to those projects certified by the Public Roads Administration of the Federal Works Agency as necessary to the successful prosecution of the war. Control was extended as far west as the Rocky Mountains by action taken on

July 2. On Oct. 5 restrictions were made effective in all States.

The procedure to be followed by State, county, city and local highway officials in making application for bituminous materials for use on public highways is a simple one. Application is made on a self-explanatory form available from State highway departments and offices of the public Roads Administration. The application should be sent to the State highway department which makes its recommendation as to the war necessity of the work and forwards it to the district office of the Public Roads Administration. Final action is taken in the Washington

headquarters on all applications except those originating in States under the western regional office, which are acted upon in the San Francisco regional office.

When an application is approved as essential to the war effort a certificate is forwarded to the applicant to be used as authority to purchase a stated amount of material.

Since the initiation of control over bituminous materials, a number of cases have arisen that do not fall in the above category and methods of handling have been agreed upon by the office of the Petroleum Coordinator for War and the Public Roads Administration.

Rulings and Interpretations of the Office of Petroleum Coordinator

Jurisdiction of Public Roads Administration

It has been agreed that public roads, streets, highways, driveways or public parkways which come under the jurisdiction of the Public Roads Administration shall include, in general, all roads outside of areas under the control of the Army or Navy and outside of manufacturing plants. The Director of Marketing, Office of Petroleum Coordinator for War, will pass on applications for bituminous road materials for use in manufacturing plants or in areas under the control of the Army or Navy.

Applications for materials for use in areas outside the jurisdiction of the Public Roads Administration should be made to the Director of Marketing, Office of Petroleum Coordinator for War, Washington, D. C.

Use and Definition of Road Oil

Issuance of certificates for road oil was discontinued on July 2, 1942. The definition of road oil, as originally

promulgated by the Office of Petroleum Coordinator, has been revised. Road oil is now defined by the Office of Petroleum Coordinator as follows:

Road oil is a slow-curing asphaltic product used in the construction and maintenance of roads. It includes any product derived from petroleum which, upon distillation to 680 degrees Fahrenheit, will yield a residue having a penetration at 77 degrees Fahrenheit, 100 grams, 5 seconds, of more than 300, and it also includes all crude petroleums. Asphaltic materials having the above characteristics are not classed as road oils when they are used exclusively for fluxing natural rock asphalt or native asphalt or when used with powdered asphalt in the preparation of plant-mixed asphaltic paving mixtures.

Natural Rock Asphalt

The Office of Petroleum Coordinator has ruled that the use of natural rock asphalt is not restricted by the provisions of Recommendation No. 45.

Therefore, it is not necessary to make application for certificates of necessity of use of natural rock asphalt *as such*.

However, some rock asphalts must be fluxed, prior to use, with asphaltic materials derived from petroleum. In such cases, applications must be made for the fluxing materials. These applications should be made for the type and quantity of fluxing material that is needed and not for the total quantity of finished rock-asphalt mixture. However, the application should contain information regarding the tons of mixture required and the quantity of fluxing material per ton so that the quantity for which application is made may be checked.

Bituminous Joint Fillers

The Office of Petroleum Coordinator has ruled that *premolded* bituminous joint fillers are not restricted by Recommendation No. 45 but that *poured* bituminous fillers do come under the restrictions and require certification.

Modifications in the Published Procedure

Maintenance Materials for Public Utility Companies

Since it is impracticable to require that municipalities submit applications for the bituminous materials needed by public utility companies for the repair and maintenance work that

they are required to perform on public streets and highways, the following modification has been made in the published procedure.

An application for bituminous road materials needed by a public utility company for maintenance work on

public highways and public streets may be submitted by an authorized official of the company. A public utility company, such as a street railway company, or a gas, water or electric company, may submit an application for the materials needed on its entire

system during a calendar year. A railroad company may submit an application covering its needs during a calendar year on that part of its system located wholly within a single State or on that part of its system that constitutes a division, as it may elect. Such application shall be submitted to the appropriate State highway department in the same manner as applications for municipal work. If the application covers materials needed on a railroad division and such division crosses a State line, the application shall be submitted to the highway department of the State in which the greater part of the division is located.

Change in Kind of Bituminous Road Materials After Issuance of Certificate of Necessity

A certificate authorizing the purchase and use of one kind of bituminous material may not be used for the purchase of another kind. For example, a certificate issued for asphalt cement may not be used for the purchase of cut-back asphalt and one issued for asphalt emulsion may not be used for the purchase of road tar. However, the grade of a given kind of material is not important. Thus, a certificate issued for *asphalt cement* may be used for the purchase of asphalt of any penetration grade even though the *application* may be for asphalt of a particular penetration grade. Similarly, if the *certificate* is issued for *cut-back asphalt* it may be used for the purchase of any grade of cutback even though the application may be for a specific grade or grades.

When a certificate has been issued for one kind of bituminous material and it is desired to change to another kind (not grade), a revised certificate must be issued. In such a case the applicant should return the original certificate for cancellation and should submit with it three copies of the first page of the application form revised with respect to the change desired in the *kind* of bituminous material. If the change is approved the Washington or San Francisco office will cancel the original certificate and issue a revised certificate. In cases of emergency the change may be authorized by telegram, pending the issuance of the revised certificate.

Projects for the Salvage of Old Rails

The War Production Board has initiated an extensive program for the recovery of scrap steel by sal-

vaging the rails of abandoned street car lines. The salvaging operation involves the repair of the pavements damaged by the removal of the rails and, in many cases, bituminous road materials are needed for this repair work.

These rail-salvage projects are financed in different ways and the Work Projects Administration is concerned with many of them. Applications for bituminous road materials needed on ordinary WPA projects must be submitted by the sponsors. However, in order to simplify the procedure and expedite the issuance of certificates, a special procedure has been established for WPA rail-salvage projects and for rail-salvage projects financed in other ways.

WPA Rail-Salvage Projects

Applications for certificates of necessity of use of bituminous road materials for the repair of street and highway pavements damaged by the salvaging of old rails on WPA projects will be made by the appropriate State Administrator of the Work Projects Administration rather than by the governmental agency sponsoring the project.

Applications will be sent to the appropriate district engineer of the Public Roads Administration rather than to the State highway department. The amount of bituminous materials for which application is made shall be the minimum amount consistent with the repair of the damaged pavement to produce a finished surface similar in character to that which existed before the salvage operation was undertaken. The application shall not cover any materials needed for repair or maintenance outside the area involved in the salvage operations. The State Administrator of the Work Projects Administration will satisfy himself that bituminous materials are to be used to the least practicable extent consistent with the attainment of the two-fold objective of obtaining needed scrap steel and conserving bituminous road materials and he will be responsible for the accuracy of the amounts for which certification is requested.

The finding of the State Administrator of the Work Projects Administration of the necessity of use of bituminous road materials, as set forth in the application, shall be accepted by the district engineer of the Public Roads Administration and he shall find the use of bituminous material to be essential and shall immediately issue a certificate of necessity on the basis of the application

filed by the State Administrator of the Work Projects Administration.

Rail-Salvage Projects Other Than Those Financed by WPA

Applications for certificates of necessity of use of bituminous road materials on rail-salvage projects not financed by the Work Projects Administration will be subject to the same procedure that is applicable to ordinary municipal projects, except that the district engineer is authorized to issue the certificate of necessity instead of forwarding it to the Washington or San Francisco office for action.

Certified Access Roads—WPA Projects

In some cases there have been delays in procuring bituminous materials for the construction of certified access roads financed by the Work Projects Administration because of the failure of project sponsors to promptly advise officials of the Work Projects Administration of the action taken by the Public Roads Administration on applications for certificates of necessity.

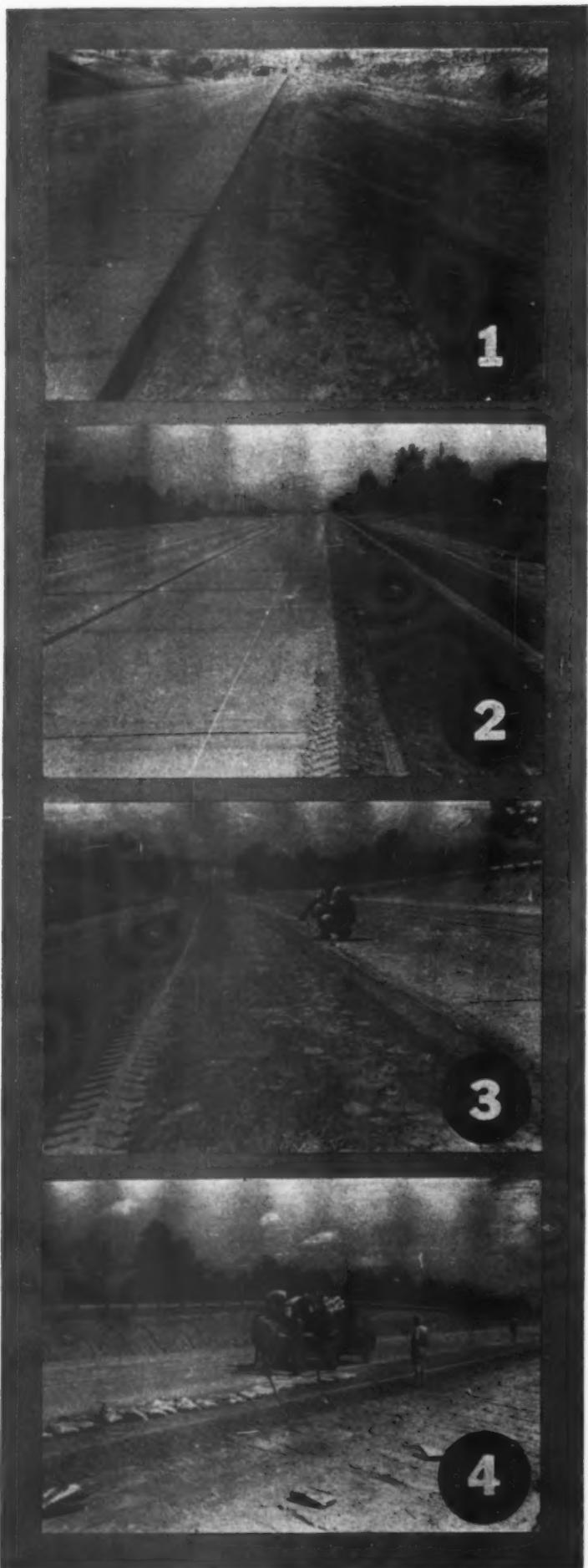
To overcome this difficulty it has been agreed that in such cases an extra copy of the applications may be submitted, to be plainly marked for return to the State Administrator of the Work Projects Administration so that he may have prompt advice regarding the action taken.

The Work Projects Administration has issued instructions that the extra copy shall be identified by an attachment bearing the following statement:

Extra Form Submitted to Permit
Advice as to Final Action on the
Application to be forwarded directly to Work Projects
Administrator for the State of
.....
Address.

Reduced State Highway Personnel Works Overtime

Although construction work on the state highway system has been limited by war conditions, a shortage of personnel in the design departments of the Indiana State Highway Commission has resulted in considerable overtime for those remaining on the job, S. C. Hadden, chairman, said recently. All departments of the Commission have been affected by the loss of trained engineers and other employes to the armed forces and to war industries.



Soil-Cement Stabilized Sh

Details and Costs of State Work in Lamar County

By JAMES E. PIRIE

District Engineer

Texas State Highway Dept.

J. R. WARD, JR.

Resident Engineer

THIS project (L-136-7-14—L-136-8-13 on U. S. Highway No. 271 in Lamar County) consisted in the placing of soil-cement stabilized shoulders on 7.0 miles of highway extending from Paris, North toward Red River. The work was performed by State Highway maintenance forces. Work began on April 21, 1942, and was completed July 7, 1942. Actual mixing operations began June 5 and were completed July 3.

Work was still in progress on the surfacing contract on this section of road when the project was started. The contract called for widening present concrete base and placing hot mix asphaltic concrete surface on 2.5 miles from Paris North (see typical section). The next 4.5 miles was constructed as new 22-ft. concrete pavement. On the new concrete paving section, select material shoulders were placed by the contractor (see typical section). On the 2.5 mile widened section no shoulders were constructed by the contractor.

The work on this project consisted in: Hauling in select material for the shoulders on the 2.5 mile section of widened surfacing, mixing, and placing 5-ft. soil-cement shoulders; mixing and placing 8-ft. shoulders on the 4.5 mile section of new pavement and placing asphalt prime coat on all of the soil-cement shoulders.

Preliminary Tests

The following tests were made on samples from the material source and from the shoulders in place:

- (1) Soil constants
- (2) Mechanical analysis by hydrometer
- (3) Proctor standard moisture density curves
- (4) A.S.T.M. soil-cement tests (wetting and drying)
- (5) Shear tests

Results of tests:

| | Material Hauled in for 2.5 Mile Section | Material in Place on 4.5 Mile Section |
|------------------------|---|---|
| PI | 2 | 4 |
| LL | 16 | 20 |
| PL | 14 | 16 |
| LS | 1.3 | 1.4 |
| % Fine Sand Size | 80 | 60 |
| % Silt Size | 15 | 33 |
| % Clay Size | 5 | 7 |
| | with 7% Cement | with 9% Cement |
| Soil Loss (Wet & Dry) | 3.15% | 1.8% |
| Shear-lbs. per sq. in. | 2660 | 3080 |

1. Showing condition of present unstable shoulder—erosion at pavement edge and ruts caused by tires during wet weather
2. Showing shoulder bladed and shaped ready for spreading cement. Note white line for mixer guide
3. Showing chain with flags to mark cement sack spacing
4. Cement spaced in sacks on shoulder

Shoulders In Texas

On the basis of these tests it was decided to use 7% cement by weight for the material hauled from the Bell Pit for the 2.5 miles of 5-ft. shoulders, and 9% cement by weight for the material in place on the 4.5 miles of 8-ft. shoulders.

Construction Procedure Equipment

- 1—Flynn Road Builder
- 1—Caterpillar No. 112 Maintainer
- 1—Caterpillar 30 Tractor
- 1—One Drum Sheepfoot Roller
- 1—Self-Propelled Pneumatic Roller
- 1—Nail Drag
- 3—1000-gal. Water Trucks
- 1—750-gal. Water Truck with Pump & Spray Bars
- 1—Farm Tractor
- 4—Cement Trucks (flat bed)

Preparation of Shoulders

Shoulders were bladed and shaped to get proper amount of material in place before the cement was spread. It was necessary to leave the material slightly above the finished grade to allow for additional compaction after mixing (see pictures 1 and 2).

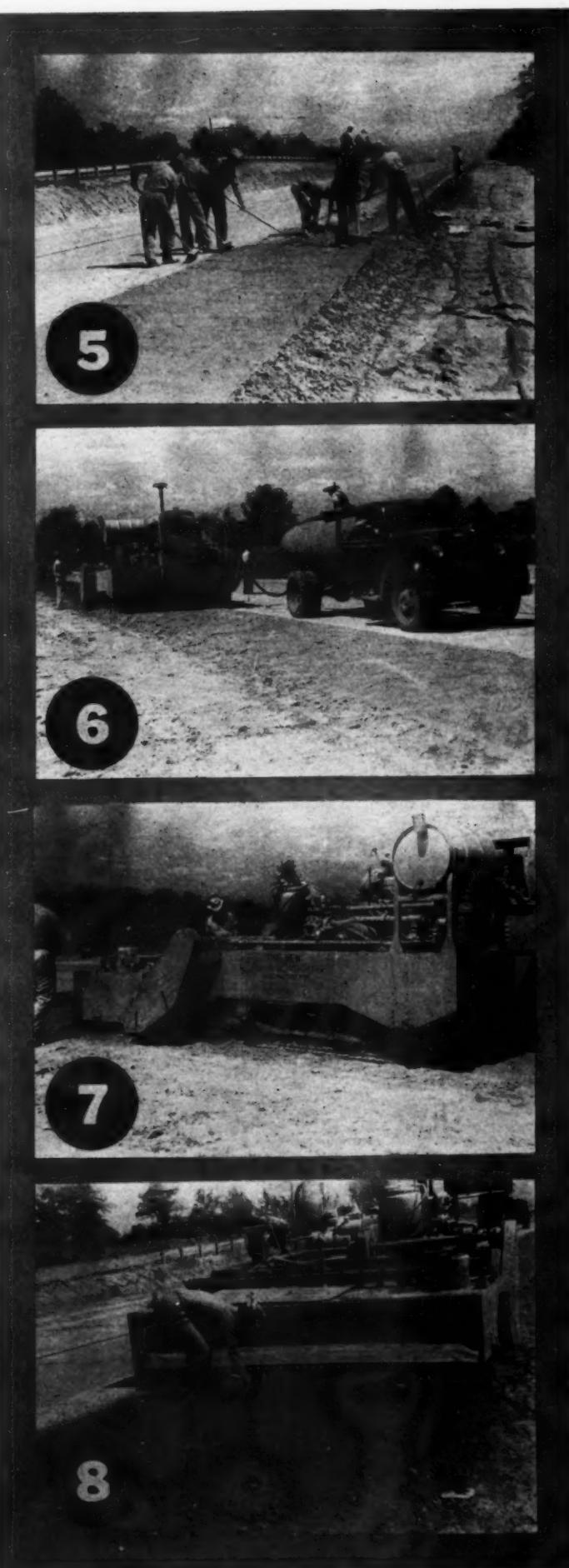
Processing of Soil-Cement Mixtures

Cement was placed on the shoulder in bags at the proper spacing to give the desired cement content (see pictures Nos. 3 and 4). The cement was placed in bags approximately 200 to 300 ft. ahead of the mixer. The sacks were opened and the cement uniformly spread by use of brooms and rakes approximately 50 ft. ahead of mixer (see picture 5). The material was then mixed with the Flynn Road Builder, which traveled at the rate of 14 ft. per minute (see pictures Nos. 6 and 7). The water required to raise the moisture content to optimum was hauled to the mixer in 1000-gal. trucks and distributed by a spray bar placed between the two mixing drums on the Road Builder.

Moisture was controlled by inspector's judgment of moisture content directly behind mixer (see pictures Nos. 8 and 9). Moisture tests were made in the laboratory as a check on this method of control. It was found that the inspector could maintain the moisture within one percent of the theoretical optimum.

Immediately after the mixing, the material was rolled with a sheepfoot roller. This was done in a continuous operation, with the roller working right up to the mixer at all times (see pictures Nos. 10 to 13). Note that the roller was pushed forward by the tractor and rolled only back and forth, and did not turn around.

After a section of approximately 200 ft. had been rolled out with the sheepfoot, the material was reshaped with the maintainer. During this operation several passes were made with the nail drag to prevent any planes being formed by blading (see pictures Nos. 13 to 16). After the maintainer completed shaping the section, the nail drag made ap-

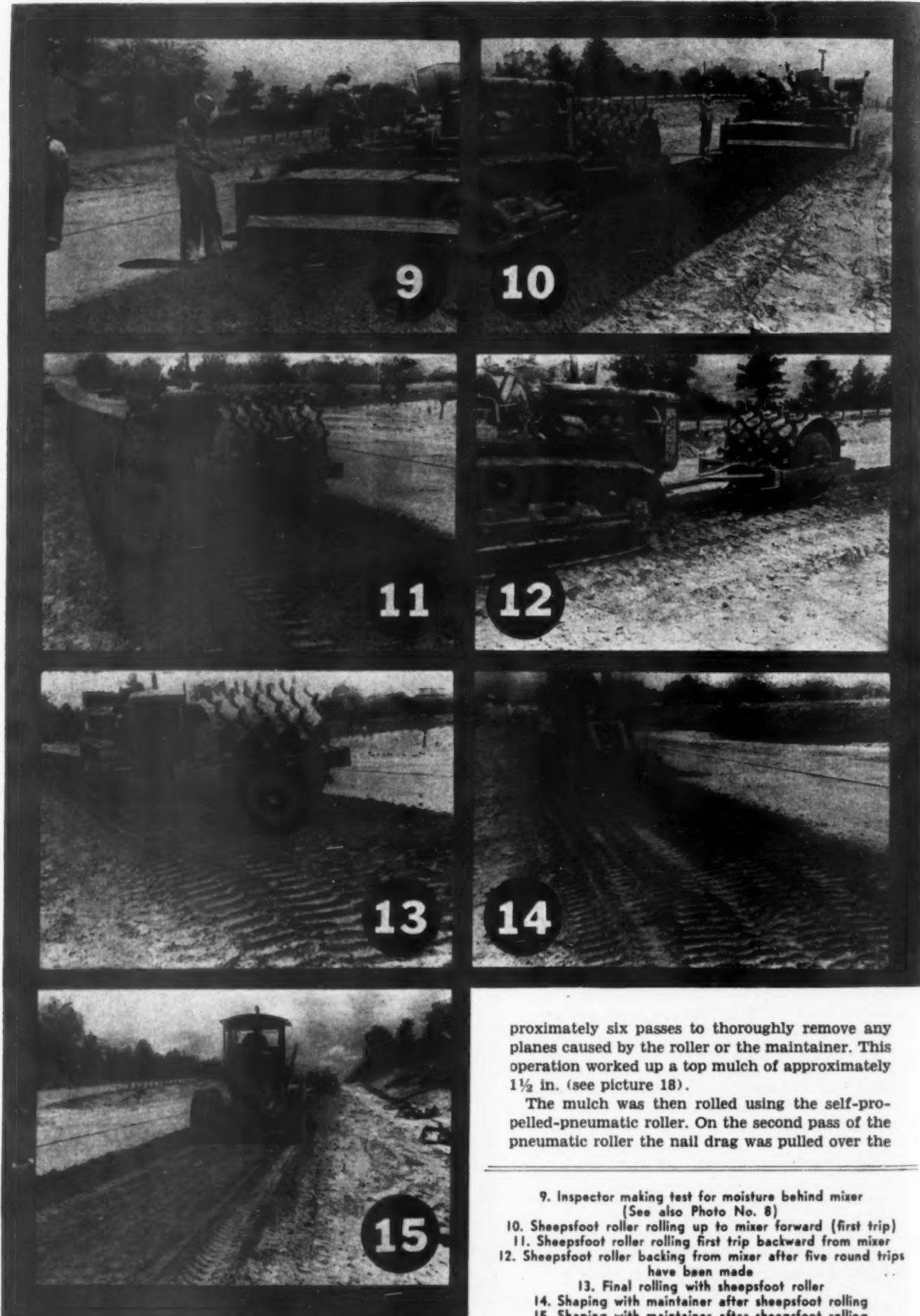


5. Spreading cement

6. Front view Ben Flynn Road Builder in operation

7. Side view (moving forward at 14 feet per minute on 8-foot shoulder)

8. Inspector making test for moisture behind mixer





16



17



18



19



20



21



22

section again to cut out any places where the material had lapped over into a rut and formed a plane. After the first section was rolled each day, the pneumatic rolling was almost a continuous operation since the roller would start rolling on a section just as soon as the nail drag was moved off (see pictures Nos. 19 to 24).

16. Nail drag following maintainer during shaping operations. After this operation the material will be bladed back to shape, and nail drag used to make top mulch

17. Nail drag following maintainer during shaping operations

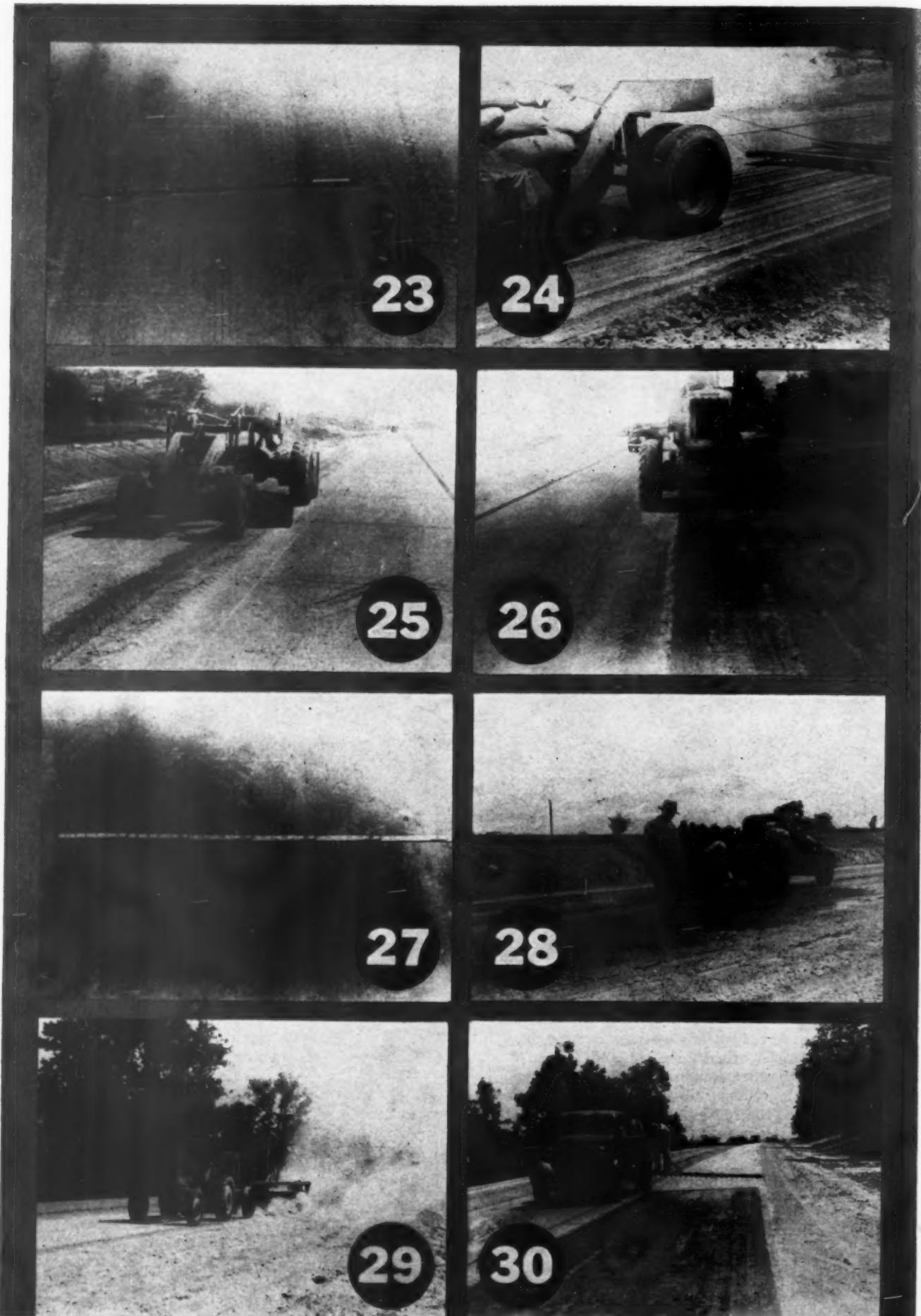
18. Texture of material just before pneumatic rolling

19. Front view of pneumatic roller—first trip

20. Rear view of pneumatic roller—first trip

21. Pneumatic roller backing up

22. Pneumatic roller on final rolling—last trip



Descriptions of these photographs are given on next page

**DESCRIPTIONS OF PHOTOGRAPHS
ON PRECEDING PAGE**

23. Texture after final rolling with pneumatic roller.
24. Nail drag pulled by pneumatic roller after two passes, to remove any planes caused from rutting on first passes of roller.
25. Front view final blading.
26. Backview final blading.
27. Texture of final surface immediately after blading.
28. Spreading sand on freshly applied cutback seal coat.
29. Rotary Broom cleaning surface of surface of shoulder.
30. Sprinkler tank backing up just ahead of the Distributor making application of cutback.

The final blading was done just as soon after the final rolling was completed as possible. With only one maintainer on the job, this was done about every two hours, or in lands of approximately 1500 ft. Enough material was mixed and rolled down to leave the grade from $\frac{1}{4}$ to $\frac{1}{2}$ in. high and this material was bladed off to the side (see pictures Nos. 25, 26, 27).

Immediately after the final surface blading, the base was covered with earth approximately one inch deep and wet down with the sprinkler truck. This earth curing was con-

| FINAL QUANTITIES AND COSTS | | | | |
|--|-----------------|----------|-------------------|--------------------|
| Item | Unit of Measure | Quantity | Derived Unit Cost | Amount |
| Sprinkling | MG | 340 | \$1.95 | \$662.41 |
| Rolling (tamping) | Hr. | 147 | 2.36 | 346.64 |
| Rolling (pneumatic) | Hr. | 134 | 1.29 | 173.50 |
| Roadbed Treatment Type B | CY | 5170 | 0.57 | 2,960.71 |
| Prime Coat (RC-2) | Gal. | 11110 | 0.08 | 902.23 |
| Aggregate (Conc. Sand) | CY | 260 | 3.73 | 968.93 |
| Preparation of Subgrade | SY | 14,239 | 0.04 | 601.72 |
| Soil Cement Base Course | SY | 54,147 | 0.066 | 3,604.56 |
| Portland Cement | Bbl. | 8547 | 2.58 | 23,097.88 |
| Overhead & Supervision | LS | — | — | 1,272.37 |
| Engineering | LS | — | — | 1,242.46 |
| Total | | | | \$34,833.41 |
| Total Cost Per Square Yard of Soil-Cement Base exclusive of Engineering and Roadbed Treatment—\$0.566. | | | | |

tinued for 72 hours.

After the soil-cement base was completed, the entire project was given a prime coat of 0.2 gal. of RC-2 cutback asphalt per sq. yd. and covered with concrete sand (see pictures Nos. 28, 29, 30). It is proposed to seal the shoulders with 0.3 gal. of OA-230 asphalt, and one cu. yd. of aggregate to 120 sq. yd. but this has not been done to date.

Observations and Construction Data

In a typical day's run approximately one mile of 8-ft. shoulder, or about 5000 sq. yd. of soil cement was mixed, placed, and completed. The maximum day run was 5920 sq. yd.

A total force of approximately 40 men was used, including engineering

and supervisory employees.

Very little difficulty was encountered in maintaining a uniform moisture content behind the mixer.

Density tests made on the completed base averaged 102% of the Proctor density.

The entire project was constructed under heavy traffic, since the construction at Camp Maxey was at its peak during this time. It was impossible to keep traffic off the newly completed base and due to this condition, some raveling occurred adjacent to the concrete pavement prior to placing of prime coat.

The prime coat of cutback does not appear to be enough to stand the traffic that is using the shoulders as a travelway at the present time.

therefore, had to be calculated closely against the rate-of-rise of the water—and, once begun, completed in a hurry.

It took two days to bring the barges and the necessary tugboats from the dam, up the two rivers to the site of the bridge. The Kettle by now was widened and quieted by the waters which were steadily backing into it. In one day, a crew of 14 men freed the bridge from its substructure and swung it down on the waiting barges. In another two days, it was at the dam and; in four days more, it was dismantled. Its still-serviceable timbers were valued at \$15 per 1,000 board feet.



Timber truss-spans on barge and tug boat convoys

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From a business standpoint . . . keeping your machinery properly serviced makes it last about twice as long . . . doubles its output before replacement — lowers investment, depreciation, operating cost, increases your profits.

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It's easy to keep 'em repaired, too! You simply reach for your 'phone, call your dealer and in a short time he'll have your outfit fixed and back to work! In every territory, throughout the continent, there is an Allis-Chalmers dealer ready to give you quick, expert service and advice. When you have a problem, his knowledge and experience plus yours will quickly solve it. When you have a repair or rebuild job he'll furnish you the highest type mechanical skill, using genuine parts replacements. Dealer service is mighty valuable — use it to your fullest extent. Keep in close touch with your Allis-Chalmers dealer at all times. Let him help you keep 'em going!



Running a machine in need of repairs one day longer than you should may require 10 times as much critical material when you finally have it fixed—be many times as expensive. Protect your own interest . . . help the war effort — have your Allis-Chalmers dealer repair, replace, rebuild your outfits now.

**THROW YOUR SCRAP
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Reflectorized Guide Posts Help Driving On Wyoming Highways

THE greater part of the Wyoming State Highway System lies at an elevation above 5,000 ft. and is subject to many storms during the winter months. The cold, dry, atmosphere, coupled with strong wind, often causes what is termed a "ground blizzard" in certain high plains areas of the State. This phenomenon occurs even though there is no precipitation during the storm, which fact has resulted in the use of the name, "ground blizzard," to aptly describe this type of storm. At the height of these blizzards it is extremely difficult for the average motorist to travel, on account of his inability to distinguish the road, and in particular the road shoulders, from the surrounding terrain. Visibility is often almost completely obscured in the worst storms because of the fine, dry, snow drifting across the roadway, and, at the same time being blown vertically in the air to heights of 30 feet or more.

Wyoming State Highway Department Engineers have spent considerable time and effort in studying the problem of drifting snow, and over a long period of years have developed a design of roadway section which has overcome drifting on the roadbed. Typical grading sections are used having shallow cuts, or borrow pits, with flat slopes on both fills and cuts, so that the snow does not form in drifts on the road surface. This result is obtained mainly by using flat slopes, because there is less tendency for the air currents to be deflected abruptly and the wind-borne snow is carried freely across the roadway and not deposited on the roadbed. Back slopes of 6 to 1 on the cuts, and the same rate of slope on the fills up to 3 feet in height, are used in all road designs through areas subject to blizzards and heavy drifting. Flat slopes, however, do not overcome the difficulty which the driver experiences because of poor visibility during these storms, or in fog and on dark, rainy nights. It was necessary, therefore, to develop something to make driving more convenient and safe for the motorist.

By C. W. BEAVER

Chief Draftsman, Wyoming State Highway Department, Cheyenne, Wyoming

In order to facilitate driving through these periods of poor visibility, a number of experimental sections using reflectorized guide posts

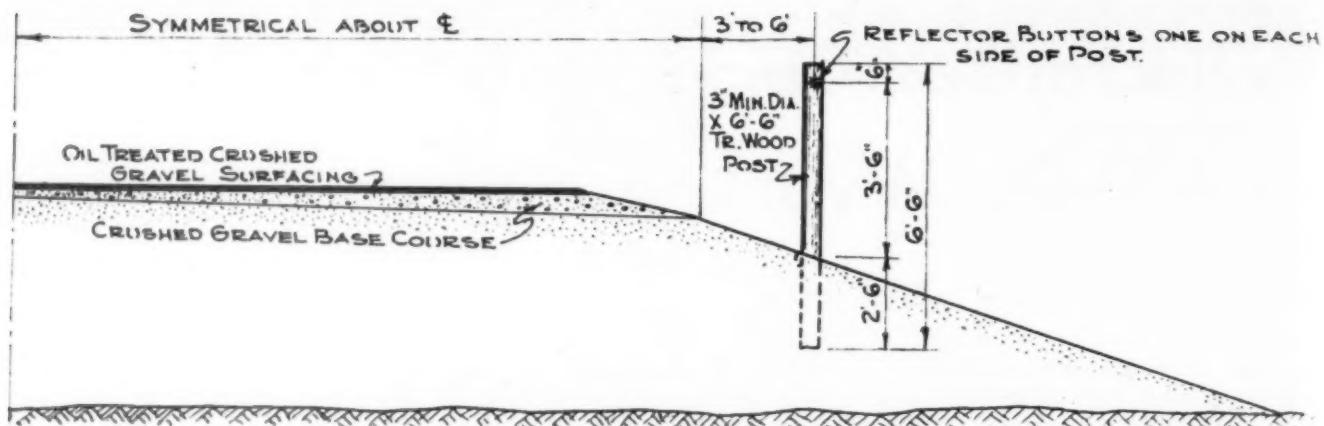
This particular section of road is subject to severe ground blizzards during the winter storms and also many heavy fogs occur which make driving very difficult. Three-inch minimum diameter creosote treated wood posts, 6-ft. 6-in. long were used to delineate



Two views showing reflectorized guide posts on U. S. Route 30 over Sherman Hill between Cheyenne and Laramie, Wyoming. In the lower view, the "cat's eye" is clearly visible in the post in the foreground

to delineate the shoulders of the roadway were installed in the fall of 1940 on U. S. Route 30 over Sherman Hill between Cheyenne and Laramie.

the roadway shoulders. A reflector button or "cat's eye" was placed on each side of the posts, 6 in. from the top. The posts were set in the ground



Typical half section of roadway, showing location of reflectorized guide posts

2-ft. 6-in., and were placed on the slopes from 3 to 6 feet outside of shoulder-lines at intervals of 200 ft. along the highway.

From the start it was evident that these reflectorized guide posts were the very thing needed to lessen the hazard of driving through ground blizzards and fog, this being more especially true during darkness than in daylight hours. The average driver could now travel through the ground blizzard areas and heavy fog with a reasonable degree of safety when the shoulders of the road were marked by the guide posts and reflector buttons.

In the fall of 1941 a number of projects were initiated to place these reflectorized guide posts on U. S. Route 30 through the areas subject to the worst ground blizzards. These were an extension of the previous work over Sherman Hill between Cheyenne and Laramie and on the new streamlined section 108 miles long between Rawlins and Rock Springs. Installations have been made also on many of the tangents and all of the curves between Laramie and Medicine Bow. The total length of installations placed to date amounts to about 200 miles, and the average cost has been approximately \$50.00 per mile. The cost, of course, runs higher than this on sections of heavy curvature which have more posts, and is less on light curvature because of fewer posts. This figure includes materials, labor for installation, and engineering and supervision costs.

A closer spacing is used on curves than on tangents. On the first experimental sections tried, a 200-ft. spacing was used throughout, but on the sharp curves this spacing was very confusing to the driver, because it was too long to show the general course of the curve, and it was necessary to decrease the spacing. The posts are not placed on the inside of sharp curves, for they are of little value in that location because the headlights do not strike the reflector

buttons until the vehicle is too close to make them of much help in showing the direction of the curve. Unless there is some unusual condition, the post spacings now used for all installations are as given in the table.

| | | |
|----------------------------|---------|--------------|
| Tangents | 200 ft. | Both sides |
| 1° and 2° curves | 150 " | " " |
| 3°, 4° and 5° curves | 100 " | Outside only |
| 6°, 7°, 8° and | | |
| 9° curves | 75 " | " " |
| 10°, 11°, 12°, 13° & | | |
| 14° curves | 50 " | " " |
| 15° curves and over. | 40 " | " " |

A creosote treated wood post of 3-in. minimum diameter by 6-ft. 6-in. long costs the department approximately 30 cts. including the reflector buttons. Continuous installations of these posts have been placed on U. S. Route 30 over Sherman Hill between Cheyenne and Laramie and on the new streamlined section 108 miles long between Rawlins and Rock Springs. Installations have been made also on many of the tangents and all of the curves between Laramie and Medicine Bow. The total length of installations placed to date amounts to about 200 miles, and the average cost has been approximately \$50.00 per mile. The cost, of course, runs higher than this on sections of heavy curvature which have more posts, and is less on light curvature because of fewer posts. This figure includes materials, labor for installation, and engineering and supervision costs.

The Wyoming State Highway Department was one of the first to place reflectorized guide posts to delineate the shoulders of the road for the safety and convenience of the motorist when driving through storms or periods of poor visibility. Much favorable comment has been received from the travelling public in regard to these installations. And because they contribute greatly to the safety and convenience of driving, it is planned to continue their use and to make them a permanent part of the highway.

Committee of Engineers and Scientists Appointed for WPB

Appointment of a committee of engineers and scientists to determine the manner in which the projected Office of Technical Development should be set up within the War Production Board, and to define the scope, functions and method of operations which the Office should have, was announced recently by Chairman Donald M. Nelson.

Decision to establish such an Office was made earlier, following a report by a previous committee recommending that the War Production Board set up a strong scientific and technical organization to make sure that the nation's technical ability and resources were utilized to the full in the war production program.

Chairman of the new committee is Webster N. Jones, Director of the College of Engineering, Carnegie Institute of Technology at Pittsburgh. Other members are:

Dr. Lawrence W. Bass, Director of Research, New England Industrial Research Foundation, Boston.

Dr. Oliver E. Buckley, President, Bell Telephone Laboratories, New York.

Col. Clarence E. Davies, Ordnance Department, U. S. Army, Washington.

Dr. Ray P. Dinsmore, Manager, Development Department, The Goodyear Tire and Rubber Co., Akron, Ohio.

Admiral J. A. Furer, U. S. Navy, Washington.

Dr. Jerome C. Hunsaker, head of the Departments of Mechanical and Aeronautical Engineering, Massachusetts Institute of Technology, Cambridge, Mass.

H. W. Graham, Director of Metallurgy and Research, Jones and Laughlin Steel Corp., Pittsburgh.

S. D. Kirkpatrick, Editor of "Chemical and Metallurgical Engineering."

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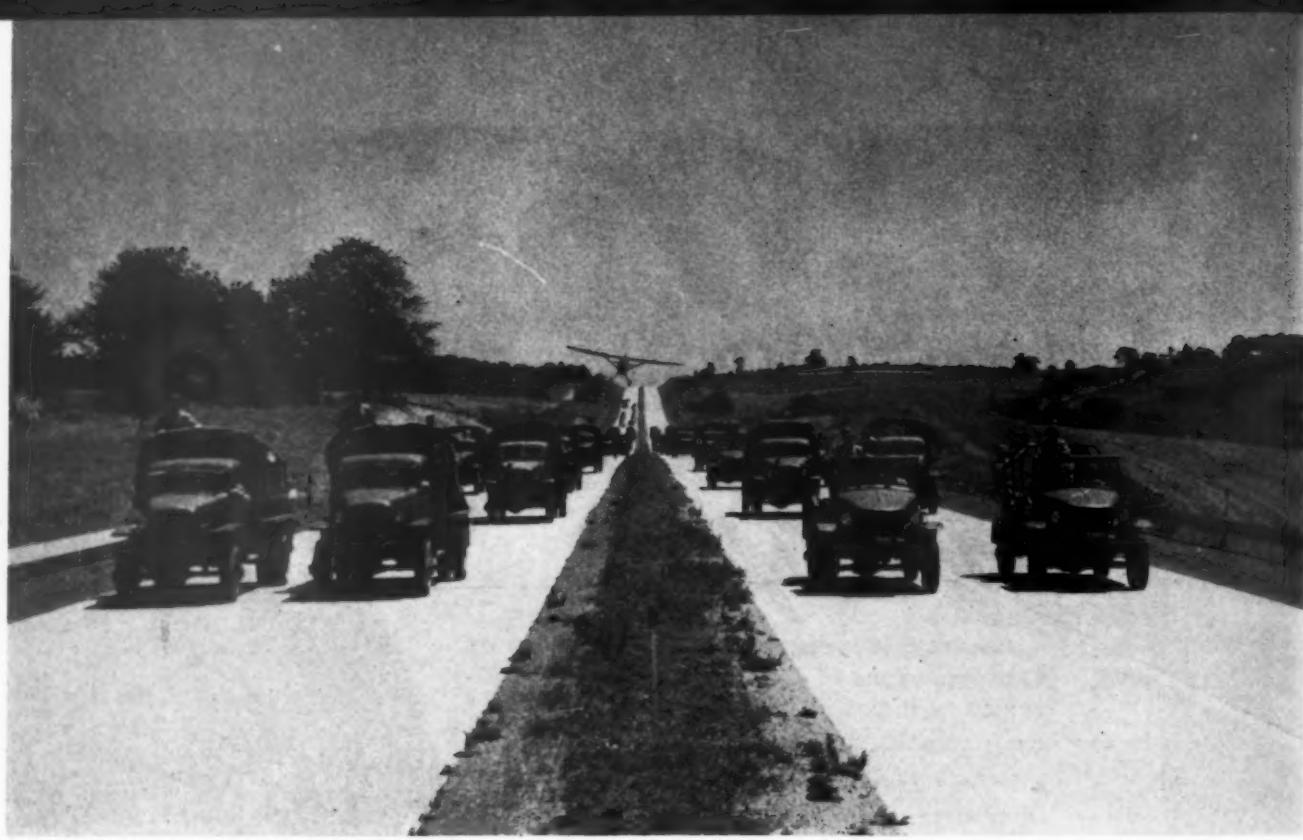
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WASHINGTON, D. C.

PORTLAND, OREGON

ROADS AND STREETS, November, 1942



Pennsylvania Turnpike in War-Time

TRAFFIC over the Pennsylvania Turnpike at the present time includes over 1,000 trucks per day, and these trucks are now responsible for 60 percent of the Turnpike's revenue.

This 160-mile superhighway between the outskirts of Harrisburg, Pa., and the outskirts of Pittsburgh, was opened Oct. 1, 1940. The first year's operation showed an average

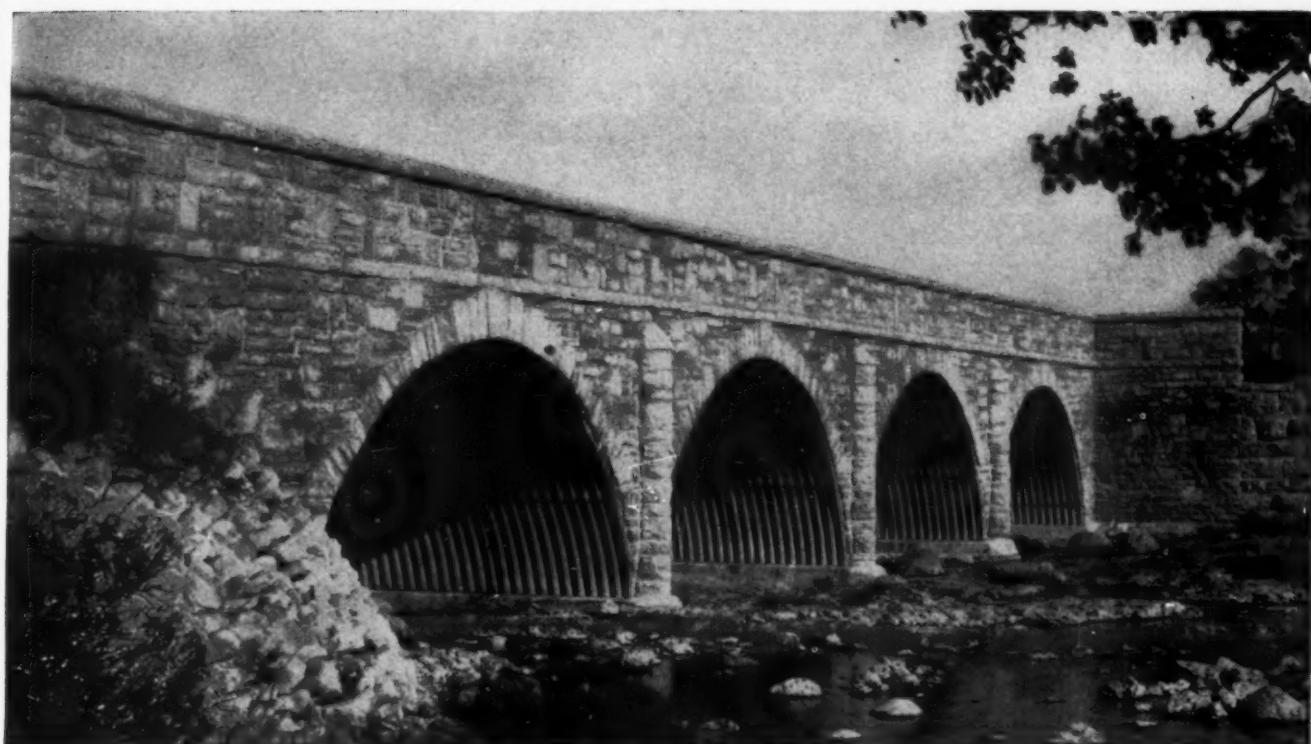
of 6,775 motor vehicles per day and a total revenue of nearly three million dollars.

In the second year the revenue dropped to less than \$2,500,000. Curtailment of pleasure driving reduced passenger car traffic by two-thirds; but there was a 25 percent increase in truck traffic and a slight increase in the use of busses.

Traffic on Oct. 1 was around 4,000 vehicles per day, of which 25 per cent are trucks, the greater number of these being large tractor units.

However, the present rate of traffic is reported to be producing sufficient revenue to meet bond interest payments and maintenance costs. Here we have two views of typical army movements on this highway.





Just Suppose This Bridge Were Not There

Picture the plight of America at war . . . without adequate highway drainage . . . for the modern all weather highways depend upon adequate drainage for their year-round efficiency.

Happily for all of us, our vast network of highways represents by far the greatest total mileage of surfaced roads of any nation on earth. Moreover, America has the best roads in the world . . . thanks to modern methods, the finest of materials and the most advanced engineering skill.

Good bridges, already in service, are helping to speed, without delay, vital war materials from where they are made

to where they are needed for action.

It is fortunate that many highway bridges over which war materials must pass, were constructed of Toncan Iron Sectional Plates. The strength of corrugated plates and the long life of Toncan Copper Molybdenum Iron are proving their worth . . . now that dependable, uninterrupted transportation is so vital to a United Nations' Victory.

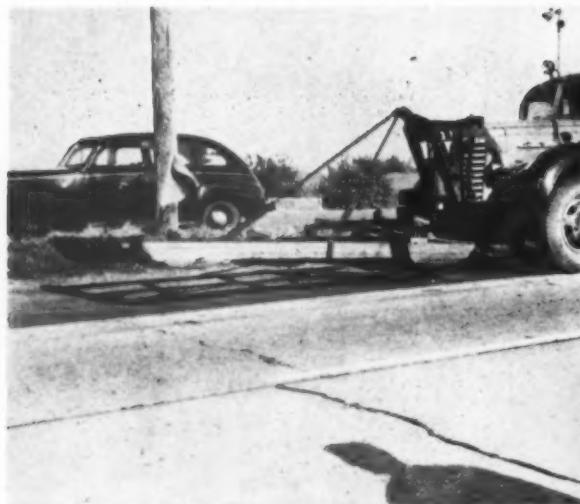
Highway engineers share with us the pride that comes from having specified and installed Toncan Iron corrugated structures when they were available. The Toncan Culvert Manufacturers Association, Republic Bldg., Cleveland, O.

- Made of the rust-resisting Toncan Copper Molybdenum Iron . . . Product of Republic Steel Corporation.
- In diameters of 6" to 84".
- Meets State and Federal Specifications.

TONCAN IRON Corrugated METAL PIPE

- Quick, easy installations by unskilled labor.
- Strength for heavy loads . . . low annual cost.
- Easily extended or salvaged for relocation.

KEEP THIS MODERN DRAINAGE PIPE IN YOUR MENTAL SPECIFICATION FILE



Hone lifted by hydraulic snow plow rig



Hone attached to front end of truck



Front end of hone

New Method of Honing Bituminous Road Surfaces

THE Connecticut State Highway Department, which was a pioneer in honing bituminous road surfaces and shoulders, now has a substantial improvement in the method of doing the work. Over the years Connecticut has tried changes in blade placement and in the form of the hone, but always has used a drag hone, fastened to the rear of a truck.

The new plan devised by H. E. Dickinson, Acting Maintenance Supervisor, moves the hone from its former location at the rear and places it in front of the truck attached to a hydraulic snow-plow rig. The change provides several marked improvements in operation. Outstanding is the precise control that is exercised over the "bite" the hone takes in the surface over which it passes. The hydraulic lift makes possible any pressure from a gentle, feather-like touch to the full weight of the hone.

Under the old drag-line plan, the weight of the hone was the sole fac-

tor in determining "bite". Sometimes, in cases of newly laid material, the hone was too heavy for the surface and created undue disturbance of the material.

While the new hone passes over slight obstructions in much the same manner as the old—by bumping upward slightly—it does not have the fault of rising over an accumulation of excess material. Under the old process this happened from time to time, but with the new hone the added weight of the propelling truck keeps the hone down and spreads the excess material evenly.

It is possible under the new plan to lift the hone, back up the truck and repeat the process of honing at any point where it seems desirable. With a drag hone repeat trips required a complete turn-around of truck and hone with consequent delays to passing traffic and some danger as well.

The new hone offers positive control laterally and vertically. It has no dangerous side-sway as has the drag-hone and the pressure on the

surface being honed may be made heavy or light as circumstances require. Heavy pressure is increased by the weight of the truck and plow rig while at the other extreme the hone may be carried clear of the roadway at any time when it is not desired to use it. The latter fact promises savings in critical steel as well as in cash.

Reduced labor costs are always important but in the current labor market this importance is vastly greater than usual. Under the old plan a truck driver and an operator were required for each drag hone, and frequently a flagman, too, was needed. In addition, a crew of several men were needed each time the hone was lifted to or from the body of the truck.

Mr. Dickinson's plan requires a driver alone. The controls for the snow plow rig are in the cab and available to the driver without a move from his seat. The driver can watch every operation of the hone, raise it or lower at will and, in general, operate it without assistance.

War DEMANDS INCREASED Peace-Time Care



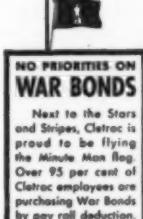
★ AS A TRACTOR OWNER you gave careful attention to tractor maintenance by frequent inspection, regular lubrication and prompt repairs, to every piece of equipment. Peace-time economies dictated this attention.

War-time *rush* puts greater demands than ever upon continued use and full operation—with less time for maintenance attentions.

Your Cletracs were "Built to Endure"—and will take a lot of punishment. But they are precision machines, made of steel, and like all machines, subject to wear. Proper inspection,

regular lubrication and careful maintenance will make their "Built to Endure" construction last *longer*—even under war demands for greater and more constant use. Your Cletrac dealer is anxious to assist you with repair parts and repair service that will help you secure the utmost out of your present equipment. Use the facilities, experience and personnel he has available. You can make increased peace-time care pay war-time dividends.

THE CLEVELAND TRACTOR COMPANY
CLEVELAND, OHIO



Cletrac Crawler Tractors GASOLINE AND DIESEL



New Regulation for Construction Price Control

A NEW regulation providing a specialized price control for the vast American construction industry was issued Oct. 31 by Price Administrator Leon Henderson.

The regulation covers all construction and maintenance services and sales in which contractors, builders, installers and erectors furnish building or industrial equipment or materials, together with the labor or services required for actual construction, installation or service.

The pricing provisions of the new regulation are designed to accomplish three things: (1) to maintain the March, 1942, price level (with some exceptions); (2) to afford a workable means for determining a maximum price at this level; and (3) to maintain a constant observation over prices of construction not already under the control of other government agencies in order to disclose any activity where existing controls are not adequately preventing inflationary pricing. Since May, the industry in most instances has been subject to the General Maximum Price Regulation.

Ceilings established by the new regulation are the equivalent of those generally in effect during March, 1942, adjusted for increases in labor costs between March 31, 1942, and July 1, 1942, the date on which the construction industry stabilization agreement between certain government agencies and the Building Trades Department of the American Federation became effective.

The field covered by the regulation is so broad that it extends from the simple repair of a leak in a roof to the construction of a great project like Boulder Dam. Included are such jobs as the stringing of new telephone or power lines, and the construction of streets and sewers. Ceilings also are established on everyday ordinary household repair and service jobs by plumbers, paperhanglers, carpenters and electricians.

The regulation covers construction and repair work when done by the "job," but it does not apply to the wages of persons performing these jobs. Thus, a reroofing contract that named a price for the entire job is covered by this regulation, but if the householder bought the roofing mate-

rial and employed a roofer to lay it, the pair would not be subject to the regulation.

Representatives of the interested unions, as well as contractors and representatives of the national contractors' associations, along with Government representatives, participated in the conferences which led to the formulation of the regulation.

The new controls are contained in Maximum Price Regulation No. 251—Construction and Maintenance Services and Sales of Building and Industrial Equipment and Materials on an Installed or Erected Basis—and becomes effective November 5, 1942.

In order to adjust the pricing mechanism to the nature and practices of the industry and to simplify its administration, maximum pricing formulas have been established for three different types of sales: (1) sales of all types not in excess of \$500; (2) sales in excess of \$500 on a cost-plus basis; and (3) sales in excess of \$500 on lump-sum basis.

A short formula has been outlined for the sales below \$500.

This is: To the price which would have been charged for the sale in March, 1942, the seller may add the increases in labor costs on the job up until July 1, 1942. The result is his maximum price.

For contracts of more than \$500 on a basis of cost plus a percentage of cost, or cost plus a fixed fee, or any other basis in addition to cost, maximum prices are to be computed as follows:

1. Materials and supplies at actual cost.

2. Labor at actual cost, but in amount not to exceed labor costs at rates in the area of installation in effect on July 1, 1942.

3. Other direct actual costs, including cost of sub-contracts.

4. Margin for overhead and profit at March (1942) rates, based on a comparable sale, or under certain circumstances, the seller's general experience and that of the industry.

In contracts of more than \$500 on a lump-sum basis, maximum prices are to be computed as follows:

1. Estimated cost of materials and supplies.

2. Estimated labor costs on the basis of rates in the area of installation in effect on July 1, 1942.

3. Estimated other direct costs, including subcontracts.

4. Estimated reserve for contingencies.

5. Estimated margin for overhead and profit at March (1942) rates, listing the method by which this is computed.

Every contract entered into, excepting those of \$500 or less, after the effective date of the new regulation must be reported to the Office of Price Administration. The agency has designed a system for filing these reports, permitting contractors, where possible, to use copies of their estimating sheets and other ordinary cost formulas. They must be filed within ten days after the award of the contract.

Not less than ten days preceding final settlement under a lump-sum contract, the contractor is required to file a further report with the Office of Price Administration, setting forth the actual costs of the various items indicated in the original estimates on file.

It is the responsibility of the contractor, in all instances, to have a copy of the new regulation available for examination by his purchasers.

The new regulation excepts from its provisions contracts with the War and Navy Departments under certain circumstances. Contractors engaged in work for the War or Navy Department, or subcontractors on their jobs, are excluded on the condition that the department involved certify that the contract or subcontract has been negotiated, or will be renegotiated, in accordance with a plan previously filed by the agency with the Office of Price Administration.

This was done because the Office of Price Administration investigation prior to issuance of the order showed that War and Navy already were exercising some degree of control over the prices they paid for the performance of construction work. Contractors on such work also will have to file certificates saying they have not purchased any materials at higher than maximum legal prices.

With these exceptions, the new order is designed to regulate all kinds of sales and services common to the

(Continued on page 66)

***Care and Repair
in Shop and Field***

CONSERVATION ROAD

**CONSTRUCTION
EQUIPMENT
MAINTENANCE**

A SPECIAL SECTION OF ROADS & STREETS

Care, Repair and Maintenance of Equipment



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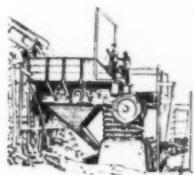
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Equipment Maintenance

How to Make Crushers Last Longer

The Pioneer Engineering Works has been using page advertisements in the technical press featuring the care of its jaw and roll crushers. The following points are taken from the advertisements:

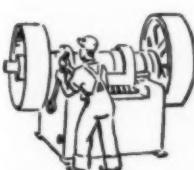
5 Ways to Make Jaw Crushers Last Longer



1. Lubricate regularly and often. Keep oil clean. A little oil every day is better than a lot of oil once a week. It flushes out the oil seals and keeps the bearings clean. Grease both ends of the toggle plates, too.



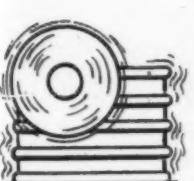
2. Reverse jaws when worn smooth at bottom and replace jaws when worn at top and bottom. Corrugated jaws crush easier and have more capacity. Neglected jaws can cause costly breakdowns.



3. Keep bolts tight. Loose bolts cause excessive wear, misalignment and may injure the crusher.

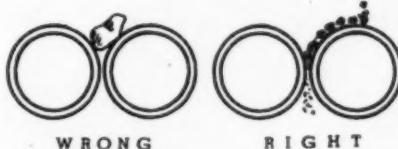


4. Feed rocks that the jaw plates can grab. Rocks that are too big plug the crusher, delay production, and may damage the crusher.



5. Don't run crusher faster than rated speed. Increased speed does not increase production and does cause excessive wear.

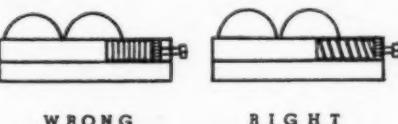
7 Ways to Make Roll Crushers Last Longer



1. Feed rock that the rolls can grab. Too large rocks will ride on the rolls and cut grooves in the shells.



2. Feed crusher evenly over full surface of shells. Uneven feed will reduce production and cause uneven wear.



3. Keep springs tight enough to crush—but with sufficient play for safety.



4. Keep all bolts tight. Loose bolts cause unnecessary wear and may damage bearings or the crusher. Wedge bolts on roll shells will loosen during operation and should be tightened regularly.



5. Keep cheek plates properly adjusted and replace when worn.



6. Lubricate regularly and often. Grease all fittings. Grease slide bars. Check oil in gear cases.



7. Check all keys and see that they are tight.

On the Operation of Center Differentials

One of the 1942 series of service bulletins (No. 274) issued by The Four Wheel Drive Auto Company, contains the following regarding the handling of center differentials so as to give most effective service with least strain on driving mechanism and least wear on tires.

A center differential is necessary in four wheel drive trucks because it compensates for the difference in distance travelled by the front and rear wheels, just as a differential in

a rear driven truck or automobile compensates for the difference in distance travelled between the two rear wheels when rounding corners or travelling over uneven ground. If the center differential were eliminated, and a solid drive used between the front and rear axle, the rear wheels would be compelled to slip when rounding corners because the front wheels travel farther than the rear wheels do. It is simple logic and a proven fact that such a condition causes excessive tire wear and

also puts a severe strain on the driving mechanism of the truck.

FWD trucks are provided with a center differential, which, when properly used eliminates all possibility of strain on the driving mechanism and the resulting failures of parts and excessive wear of tires.

During normal operating conditions the FWD truck should be operated with the center differential unlocked. This allows complete free working of the entire driving mechanism and eliminates all possibility of tire slippage due to the uneven travel of the front and rear wheels.

There are certain times, however, when center differential action should be cut out, making the front and rear propeller shafts a rigid drive. Should either the front or rear tires lose traction, power is transmitted to the point of least resistance thus causing the wheels with the least traction to spin. In a case of this kind the center differential should be locked. After the difficult terrain has been passed the differential should be immediately unlocked. It is not necessary to stop the truck in order to lock the differential. If a bad place is noticed in the road ahead a good operator will lock the differential before losing traction and will invariably negotiate the unfavorable road condition with a minimum of tire slippage and difficulty. After the bad roadway has been passed the differential should be immediately unlocked.

A good truck operator can do a great deal to help conserve rubber and metal by having a complete understanding of the operation of the FWD center differential.

Tire Inspection Program Cuts Replacements Nearly Half

A reduction of truck and trailer tire replacements by 46 per cent within a year, resulted from a tire-saving program put into effect by the U. S. Truck Co., Detroit, Mich. This company, one of the largest motor common carriers in the country, secured this reduction by making every driver responsible for the continual inspection of the tires on his own vehicle. Disciplinary measures were instituted to make sure that the inspections are properly carried out. Every driver is fully responsible for continual inspections, not only at the start and finish of runs, but at every logical opportunity along the way. Inspections cover not only inflation, but also cuts, bruises, signs of unusual wear, etc.

Skillful Building of Lower Track Wheel

The illustration below shows a home made support which will permit revolving the wheel and materially assist in laying the bead on the wheels more rapidly. This is a Model F, lower track wheel assembly in the



illustration. In building up this wheel assembly 3 pounds of rod was used for both faces of the wheels. When the wheels are going to be

operated on a new track Lincoln's Fleetweld, No. 7, or a rod of equal characteristics is satisfactory. This rod will peen over and after a few days of operation will leave a very smooth face and will not require grinding or smoothing down and will not damage the track rails.

We know of one contractor who, when it is necessary to build up the rails of his track, uses Lincoln Wearweld on both the tracks and the wheel and does not do any finishing work on any face. This gives him a Rockwell hardness of C42 to 45 on the first layer and on the second layer of material, a Rockwell hardness of C-48 to 52. We have observed both the wheels and the track rails where Lincoln Wearweld rod has been used in operation, and after a week's work they have peened themselves out and they both were smooth without any grinding.

Do not use this hard rod unless you are going to face both rails and wheels. Otherwise it will probably produce abnormal wear on the members not faced.

The cost of building up the wheel on the above illustration was approximately \$15.00 for rod and labor without any machine work or grinding thereon.

ROADS AND STREETS is indebted to *Cletrac Facts* for the foregoing account.

Operation and Maintenance of Truck Hoists and Bodies

In order to secure maximum service and life from its products Hercules Steel Products Co., Galion, O., is using stickers which are placed on the windshield of every truck unit which is equipped with a Hercules hoist and body. Two stickers are supplied as follows:

METHOD OF OPERATION

Hoist Models K, KD and P. PD

with

Lever Controls

1. Disengage clutch.
2. Place Power Take-off in motion by shifting Power Take-off into gear. (This is lever next to transmission).

3. Engage clutch.

4. To raise body shift the hoist lever to middle operating position. Ball check will then engage in groove in valve stem. Do not disengage clutch

in this operation. The hoist will stop automatically when maximum dumping angle is reached. Do not race motor.

5. To hold body in up position, pull lever all of the way back toward Operator. When driving truck, leave the hoist lever in hold position, and throw take-off out of gear.

6. To release body, shift lever away from Operator, to forward position. Lever is then in the position farthest away from Operator. The body may be raised or lowered at any time while truck is in motion or stationary without injury to truck or hoist mechanism.

7. Clutch should always be disengaged when Power Take-off is shifted!

8. Hoist can be controlled or stopped in any of the following three ways: a.—Disengaging clutch; b.—

Shifting Power Take-off control lever; c.—Shifting hoist lever to hold position.

9. Power Take-off should be disengaged when hoist is not in use!

Maintenance

Universal joints should be checked frequently, and lubricated with Alemitre grease through fittings provided.

When body does not raise to maximum dumping angle, remove rear cap on top of cylinder, and fill cylinder with SAE No. 10 oil. After filling cylinder, and before replacing cap, lower body to force out the excess oil, then raise body again and replace cap.

Body should be greased with Alemitre grease, wherever fittings are provided for same.

METHOD OF OPERATION

Hoist Models K and KD

with

"Button-Ease" Dash Controls

1. Disengage clutch.

2. Shift the Power Take-off dash control button in direction which engages the Power Take-off in motion.

3. Engage clutch.

4. To raise body, pull the hoist control button to the middle position. Ball check will then engage in groove in valve stem. Do not disengage clutch in this operation. The hoist will stop automatically when maximum dump-

ing angle is reached. Do not race motor.

5. To hold body in up position, pull the hoist control button all of the way out.

6. To release body, push the hoist control button all of the way in toward the dashboard. The body may be raised or lowered at any time while truck is in motion or stationary without injury to truck or hoist mechanism.

7. Clutch should always be disengaged when Power Take-off is shifted!

8. Hoist can be controlled or stopped in any of the following three ways: a.—Disengaging clutch; b.—Shifting Power Take-off control button; c.—Shifting hoist control button to hold position.

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city engineer Robert M. Smith three things are being done which are worthy of note:

Tires are switched and juggled to keep the best ones on the most important work. On older trucks, not only are the poorer tires used, depending on the type of hauling, but often dual rear wheels are reduced to singles and the loads lightened to make additional tires available for other machines.

Older trucks which have seen their best days in WPA service are being raided for interchangeable parts. What usually casts the die for one of these old fellows is for some one to say, "let's borrow its tires." Thus grounded, its chief remaining value is in supplying shafts, rods, pins, bolts, gears, etc., to keep brothers of the same model running.

A start has been made in making unobtainable parts in the garage shop. For instance, malleable iron tail-gate hooks have been replaced on several dump trucks by forging new pieces from scrap in the blacksmith shop. Likewise tail-gate pins and brackets. These gates get hard use.

More shop-made replacements are in the offing. Shop superintendent H. E. Borkenhagen plans soon to use sheet metal odds and ends for making small kettles, buckets and other tar handling equipment. Also, for replacing burned-out bottom pans in portable tar heaters. The municipal garage, while having only a small machine shop, is usually well equipped for doing wartime blacksmithing, sheet metal work and woodworking.

How to Repair Valves

The above is the title of a new bulletin on piping pointers (No. 5 in a series) just issued by Crane Co., Chicago. It explains and illustrates the various steps to take in repairing leaky gate and globe valves, as well as hints on how to reclaim discarded valves.

All valves wear out in service, but this bulletin enables the users of valves to get better and longer service by keeping them in good operating condition. The subject is most timely in these days of maximum industrial production when valves, like other piping materials, are not always easy to obtain.

A copy of this bulletin will be mailed on request of any Crane branch, or to Crane headquarters, 836 S. Michigan Ave., Chicago, Ill.

Trucks "Raided" for Parts for Brothers

Truck maintenance is one of the big problems at the municipal garage at Kenosha, Wisconsin, where two hundred and thirty pieces of equipment are being babied along

and kept in best possible condition. To date the city has been fortunate in having a good stock of parts for repairs. However, "get along" is increasingly the rule, and according to



The blacksmith at Kenosha's municipal garage is getting to be the fair-haired boy. Arrows show home-made tail-gate parts for dump truck



The Lubrication of Wire Rope

The following is a section of a valuable pocket-size volume of 80 pages entitled, "How to Keep Your Wire Rope Working," published in 1942 by American Chain and Cable Co., Inc., of Bridgeport, Connecticut. The booklet is copyrighted, and this quotation is made by permission.

Correct Lubrication

If wire ropes are to give their best service they must be lubricated regularly and so lubricated that they are protected from corrosion and excessive wear—and so that wires move more freely when load is applied and when the rope passes around sheaves and drum.

Wire rope engineers look upon the



The instant the line is operated, each one of its wires is put in motion—needs lubrication

lubricant as a necessary part of the rope they make. That is why lubricant is applied at the wire rope mill so thoroughly that every fiber of a fiber core is lubricated, each wire of every strand is lubricated, each strand of the rope is lubricated and, in the majority of cases, the finished rope body is lubricated.

For many short-lived services, factory lubrication is found to be sufficient. For others, additional lubricant must be added in the field.

A wire rope that is not properly lubricated with sufficient frequency is doomed to fail before its time just as surely as if it were put into service minus some wires or minus a strand.

Frequency of Lubrication. Frequency of lubrication depends on con-

ditions of service—load; speed; bends; presence of abrasives, moisture, acid or other corrosives.

The over-riding control is that rope parts must not be permitted to lose their protective supply of lubricant.

To realize the need for proper lubrication, think of the great number of relatively small parts, each one of which must be protected. Watch the rope.

Use Correct Lubricant. Check the wire

ropes to see that they are lubricated internally as well as externally. Smear well as externally. Smearing grease on the outside of a wire rope is not lubricating it.

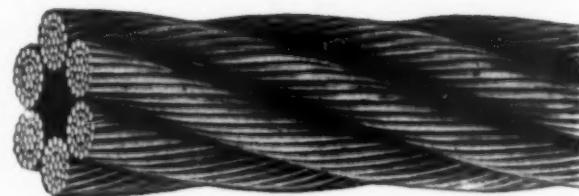
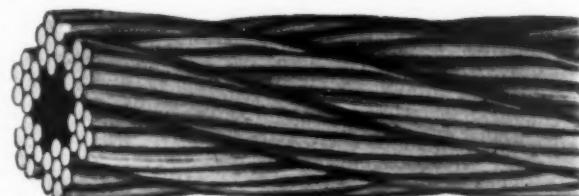
If you like, compare lubricating your rope to lubricating a motor truck. The wise man uses one lubricant, lets say, to lubricate the king bolt. That lubricant must have two qualities—ability to stay there for some time and be worked down gradually between bolt and bushing.

Worm-and-gear axles require a different lubricant from that which will lubricate hypoid gears.

An engine that requires S.A.E. 20 motor oil would be ruined if the crankcase were filled with S.A.E. 60. Why? Because S.A.E. 60 would not flow quickly to surfaces that must be reached with oil protection.

Wire rope is a machine. The instant the line is loaded or operated, each one of its wires is put in motion.

If the lubricant does not penetrate to the inner wires, those inner wires will rub against one another. That is abrasion. The abrasion, being internal, is not noted in its early stages



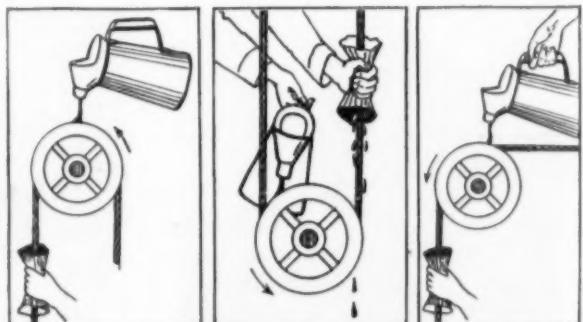
Naturally it requires a lighter lubricant to penetrate between the finer wires of 6x37 (lower) than is needed to penetrate between the larger wires of 6x7 (upper)

but the eventual loss of diameter impairs the factor of safety—may make the rope unsafe long before its day of usefulness should have ended.

Lubricant Must Reach Inner Wires and Remain to Lubricate Them. The differences of wire rope constructions complicate the selection of a lubricant for the inner wires—chiefly because, when the lubricant reaches them, it must have ability to cling to the wires until it is worked out. If it were not for this latter complication, a lubricant that would penetrate between the finest wires would be satisfactory for all wires.

But a lubricant "thin" enough to penetrate to and "cling" enough to hold to the inner wires of, say $\frac{3}{4}$ -in. wire rope of 6x37 construction would not stay long to lubricate a $\frac{3}{4}$ -in. 6x19 Warrington, to say nothing of a 6x7.

So, generally, constructions that



When lubricating a moving line, be careful. Do not hold the swab ahead of the sheave

employ smaller wires are lubricated—internally—better by lubricants of lighter viscosity.

Whatever lubricant is used, there

must be plentiful penetration to the inner wires.

General Characteristics of All Wire Rope Lubricants. The lubricant must not be soluble in water or it would wash away—emulsify—in the presence of moisture.

The lubricant must be soluble in kerosene or any of the lighter hydrocarbons to permit cleaning the rope by their use.

The lubricant must not break down in the presence of acid fumes; but, itself, must be acid-free or its use would tend to corrode the rope.

Special Conditions Well Met By Use of Proper Lubricants. If there are present, surrounding or as part of the job, both moisture and abrasives, best results come from using a thin coating of highly adhesive lubricant. That is because such a lubricant will keep the abrasive material from penetrating the rope and give the moisture a chance to flush the rope's surface.

If the rope is used in the presence of highly corrosive fumes, use a thick, unbroken coating of lubricant. If this will not penetrate to the inner wires, first lubricate with lubricant that is light enough to do this. Follow with a final application of extremely heavy lubricant—evidently applied. The working out of the lighter lubricant will thin the extra heavy lubricant to the proper viscosity.

Consider Temperature When Lubricating. Lubricants "thin out" as temperature rises.

A lubricant satisfactory in winter becomes too thin in the higher temperatures of midsummer.

That brings us to another point: wire ropes that operate in high temperatures require lubricants that, at normal temperatures, have heavier bodies.

Conditions under which a hot ladle rope operates in a steel mill provide an excellent example. If lubricant used were thin enough at 70 degrees to penetrate the wires of the rope, it would become so thin at operating temperatures that it would not "stay put." A satisfactory lubricant is one that has proper viscosity at operating temperature.

Such a lubricant, at room temperature, is too "heavy" to penetrate. Therefore a line in this high-temperature service is lubricated, usually, in a bath so designed that the lubricant can be heated approximately 10 degrees above the highest temperature at which any part of the line operates.

This "thins" the lubricant sufficiently for penetration.

Important Lubricating Suggestions

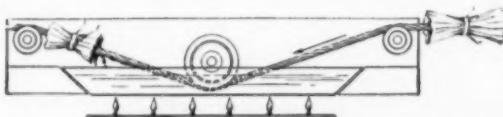
Clean wire rope thoroughly before lubricating. Use kerosene and wire brush.

Passing the wire through high pressure jetted steam has proved a very effective means of cleaning, especially larger diameters.

Wipe off excess lubricant.

Frequent lubrication with light-bodied lubricant is better than infrequent treatment with heavier lubricants.

Lubrication of any wire rope is sufficiently important to warrant calling in one of the industrial lubrication men employed by oil companies. These men can tell you which lubricant will handle your problems best.



Bath for lubricating ropes at high temperature

The wire rope illustrated in the upper corner of this page was once an elevator cable. It was not lubricated properly and was removed after less than half the service it should have given.

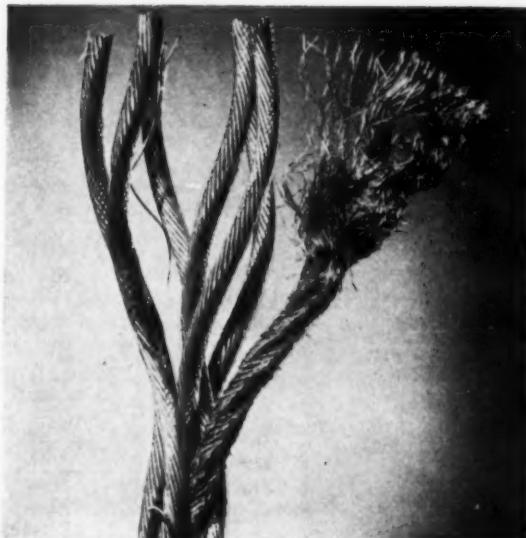
Note the dry core on the right. Note the deep-cut imprints of the strand upon it. This happened because as the core dried out it lost its resiliency—its ability to cushion and support the strands. It became reduced in diameter. The strands closed in upon it and remained there.

In closing in upon the core the wires of the rope jammed so tightly together that they broke in thousands of places.

Prevent anything like that happening to rope today. It is worthwhile to lubricate properly.

Use Bessemer Steel Where You Can

On November tenth steel consumers were urged by H. G. Batcheller, Chief of the Iron and Steel Branch, to use, wherever possible, steel made by the



Ruined through lack of lubrication

Bessemer process or re-rolled from old rails, instead of steel made by the open-hearth process.

Mr. Batcheller pointed out that in recent years, steel consumers have become accustomed to buying open-hearth steel because of the close controls obtainable over the properties of the steel.

"This practice is being continued today," Mr. Batcheller said, "despite the fact that Bessemer steel or rail steel would in many cases serve equally well."

"The supply of both Bessemer steel and re-rolled rail steel is not being used to the best possible advantage. Increased use of this supply would relieve the pressure on open-hearth steel and be a substantial contribution to the war effort."

Bessemer steel is available in many products, including bars, plates, shapes, sheets, strip, pipe, wire products and track accessories. Rail steel bars, which are rolled from old railroad rails, also are adaptable for purposes for which open-hearth steel now is being used. Such uses include reinforcement of concrete, and agricultural implements.

"All buyers should scrutinize their requirements to determine whether Bessemer steel or re-rolled rail steel will adequately satisfy their needs," Mr. Batcheller said. "Buyers who can use these grades should contact Bessemer and rail steel producers for full information."

The Iron and Steel Branch staff, Mr. Batcheller added, will be glad to cooperate with any buyers in helping them to find sources of supply for either Bessemer or rail steel.

Keeping Machinery on the Job by Welding



The Author

FOR the war's duration, every machinery user in America should adopt the slogan, "Make it last." With practically

all of our steel output, our plant facilities, as well as most of our industrial workers being diverted to war production, the big percentage of new machinery manufacture must necessarily be sacrificed and production of replacement parts curtailed. And it is clearly evident that the situation regarding availability of new machinery will get much worse before it gets better. Tanks, guns, ships, munitions and other implements of war will have first call for the duration on the materials and manpower that in normal times go into the production of industrial machinery.

Yet, because we are in a war, road construction and maintenance, for example, cannot be wholly set aside as a task not to be resumed until after the war. The actual situation is quite to the contrary. It arises from two major conditions of World War II: (1) America's original unpreparedness for war, and (2) the new techniques of battle of World War II, specifically bombing by air.

As a result of America's unreadiness for war, there is, even now after nine months of actual war, still a vast job of road construction to be done. One result of unpreparedness, was a sudden need of many new factories and the re-locating of others, many of them being established in entirely new industrial areas. Not a small number of our new war plants, aviation and munition factories particularly, are located on sites which were converted from cornfields and cow-pastures. Obviously, this new plant program involved considerable road construction work, approach roads, etc., and though much is now completed, there

By MARVIN H. RUTISHAUSER

Manager, Welding Division
Harnischfeger Corporation, Milwaukee, Wis.

is still much to be done. In addition, although started before the U. S. became actively involved in the war, the immense task of building roads to the many newly-established Military camps throughout the country, cannot be overlooked. And obviously, completion of these roads means merely the beginning of continuous repair and maintenance because of the heavy usage given them by the Military.

It goes without saying, that wartime usage of many of the Nation's principal roads is considerably heavier than in peace-time, perhaps in number of vehicles as well as in weight of loads carried. Hence, road machinery must be available for making more frequent repairs. Added to the greater military traffic on highways, there is the increased volume of commercial trucking due to the overload on railway shipping.

Secondly, because of the new techniques of warfare in World War II, America's road and street machinery must be ever on the alert and in condition for immediate use. Bombing by the enemy should be expected, as that is perhaps the most effective way that the Axis will see to attempt destruction or interruption of the flow of war goods from our highly concentrated industrial centers. The need for immediate repair of vital streets and roads is obvious, not only to permit the movement of goods and to safeguard the population of large cities, but equally important, to permit transportation of essential war workers to their jobs in manufacturing districts.

For these reasons alone, it cannot be emphasized too strongly that America's road contractors and highway departments must keep their existing machinery on the job—come what may. With replacement equipment not readily available, we've got to make the best of what we have, and that means keeping it in shape with the best kind of maintenance and repairs possible.

For many years, contractors have learned to rely more and more upon electric arc welding for increasing the durability of their equipment. For example, the practice of hard-surfacing of wearing parts with alloy electrodes was found an effective means of reducing wear and abrasion.

Welding is commonly used for increasing resistance to impact and work shock, for building up worn surfaces, as well as for making emergency repairs on any metal parts. Actually, welding is the only modern means of repairing road working equipment. Thus, naturally, when the general restriction on the sale of welding electrodes, except under high priority, was put into effect, it left the average road contractor facing a serious problem if his machinery were to be kept in good repair.

Restriction on Electrodes Eased

However, recently, the U. S. Government came to the rescue. Recognizing the importance of electric arc welding to the conservation of essential existing machinery, the WPB, through Limitations Order No. 146 now makes it possible to purchase welding electrodes for such application, without a priority. This order definitely provides that electrode manufacturers may sell a given percentage of their total output for the repair and maintenance exclusively of all types of machinery.

Limitations Order No. 146 not only indicates the Government's recognition of the need of keeping machinery in efficient working condition, but in effect places a distinct responsibility on machinery owners. Now, there is no reason for delaying repairs or for laying up worn equipment. Nor is

The Government has gone the full limit in encouraging the use of Limitations Order No. 146 by machinery owners. Purchases of welding electrodes can be made through usual sources of supply. Not only is a priority unnecessary, but there are no special forms to be filled out. Your own purchase order will do, but you must include on it this simple statement over your signature: "For maintenance and repairs pounds."

QUOTED below in full is the very practical section on servicing kerosene-distillate carburetors, from International Harvester Company's "Serviceman's Guide" for T-6 Trac-Trac-Tors. This type carburetor differs in only a few respects from the carburetor used on the high compression gasoline engines with which some of the T-6 models are equipped.

It is well to remember that many things besides the carburetor determine amount of fuel used. A motor with poor compression, faulty spark plugs or ignition adjustment, or dirty breaker points, cannot run economically. Clutch slippage, poor or insufficient lubrication in various motor and chassis parts, all exact a toll in fuel. When low fuel economy is encountered, it is well to check the entire unit, check carburetor settings, ignition adjustment, brake and clutch adjustment, amount and condition of oil in motor, transmission, drive sprockets, track rollers, track idlers, and front idlers. Be sure choke valve opens wide and note gas line, fuel pump, etc., for leaks. Grit underneath fuel level valve will cause a high level of fuel which will result in poor fuel economy. A low level of fuel will cause a loss of power. Therefore, it is well to check bowl fuel level.

It is seldom a carburetor comes in for repairs without a worn fuel valve. If replacement is necessary, by all means replace both valve and valve seat, never one or the other. After replacement of these parts be sure to check fuel level and adjust accordingly.

When dismantling a carburetor, thoroughly clean fuel filter with compressed air and blow out all passages in carburetor. When cleaning metering jet and discharge nozzle use only compressed air; never run wires through the orifices as this will change their hydraulic characteristics.

Idle adjustment screw may need replacement. Replace such valves rather than attempt to regrind.

When chasing down carburetor trouble on a motor it is well to check all external possibilities before attacking carburetor. Thoroughly clean air cleaner to remove any possible restrictions from that source. Make sure all gaskets from the air cleaner up through the carburetor are in good condition.

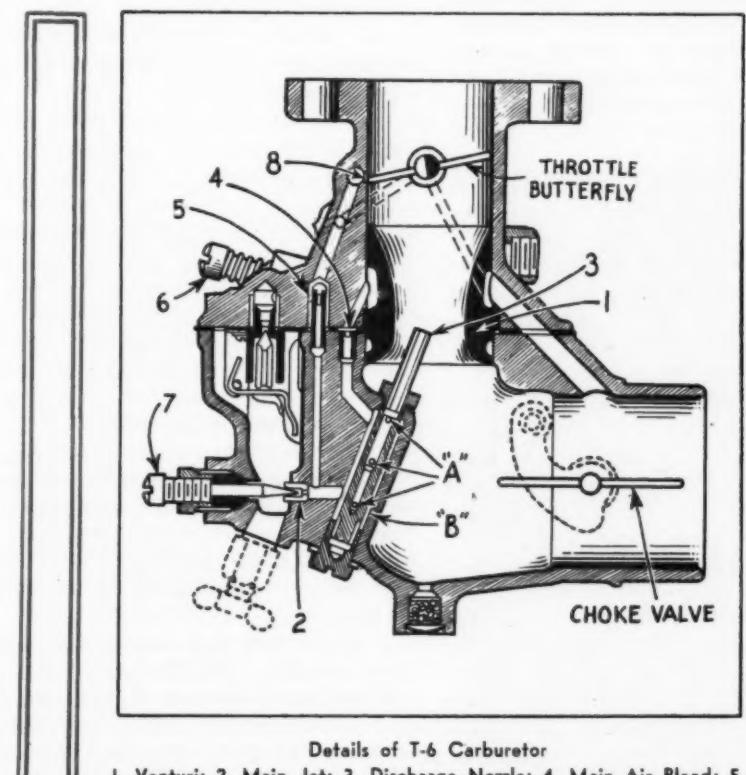
Among the various causes of hard starting are, poor compression, stiff engine, improper valve timing, water in cylinders, improper magneto tim-

Carburetor Service on Kerosene and Distillate Engines

ing, poor connections, weak condenser or magneto coil, improperly set spark plug gaps, dirt in jets of carburetor, improper idle setting, poor choking action, poor gasoline, low fuel level in carburetor bowl, overpriming or overchoking. One of the greatest offenders is the setting of spark plug gaps. Although a rich mixture is desirable for starting purposes, too rich a mixture is no good. Make sure fuel and air are both reaching carburetor; this may mean

remove carburetor and to clean all passages of any dirt and check fuel level.

Assuming that all mechanical features of the unit are in good condition, loss of power may be improper fuel level. A fuel level that is too high or too low will not allow motor to develop its full horse power. A thorough cleaning of all carburetor connections will generally improve performance. In this regard it is particularly well to check the gov-



Details of T-6 Carburetor
 1. Venturi; 2. Main Jet; 3. Discharge Nozzle; 4. Main Air Bleed; 5. Idling Jet; 6. Idle Air Adjusting Needle; 7. Main Jet Adjuster; 8. Idling Slot "A"—Holes in Discharge Nozzle "B"—Accelerating Well

cleaning air cleaner and fuel cleaners as well as checking fuel supply pump.

An engine missing under load may be traceable to the carburetor and to several other causes. A lean mixture will very often cause missing at high speed under load. Operating a kerosene motor on kerosene without properly warming engine so that indicator shows in green will cause poor performance. If adjustment of the main fuel jet does not remove the missing condition after all other mechanical and electrical possibilities have been eliminated, it is well to

renew settings as well as inspect shafts for any binding which may prevent throttle valve from opening completely.

Overheating will cause loss of power. Check thermostats, kerosene-distillate 165-190 degrees; gas 155-175 degrees.

Poor acceleration of a motor may be traceable to spark plug gaps or breaker points. Dirt in accelerator well will cause poor acceleration. If the engine operates properly at idle speeds or at full load the accelerating well is not dirty.

An Equipment Maker's General Recommendations for Engine Care

Manufacturers supplying equipment to the army are required to furnish manuals dealing in great detail with the operation and maintenance of their machines. These publications, now being brought out in large numbers, comprise an entire new literature in this field. What follows is a section from "B-G Manual 1032," a 440-page volume on the Barber-Greene Ditcher.

Care of the Engine

A general inspection of the engine should be made at regular intervals, to insure long life and to prevent breakdowns while on the road. One hour a week spent on this inspection will save time and money in the end.

Keep your engine clean. There is nothing that will better promote freedom from engine trouble than cultivating the habit of keeping the engine clean. A dirty engine often covers minor defects or maladjustments that would not become serious if given immediate attention.

1. New Engine After 8 Hours Operation and First 100 Hours.

(a) Tighten cylinder head studs and check all other studs, clamps and connections for loose fittings and leaks.

(b) Clean carburetor gasoline fuel screen and gasoline tanks strainer and sediment bulb.

2. Every 8 to 10 Hours Operation (Daily).

(a) Visual Inspection—

- See that ignition and other electrical connections are tight.
- See that water, gasoline and oil lines are tight.
- Check fan belt (tighten if necessary).
- Check oil pressure gauge. The indicator should return to zero if not sprung.

(b) Check oil level in crankcase. If necessary to add oil see recommendations under "Lubricating Instructions" (not reproduced here).

(c) Check water in radiator.

(d) Clean air filter and refill with fresh oil. Use same grade oil as in crankcase.

(e) Remove air pre-cleaner, inspect center tube and clean, if necessary, with cloth on stick. Clean and empty jar on pre-cleaner.

3. Every 50 Hours Operation.

(a) Repeat instructions on 8 to 10 hour operation.

(b) Change oil in crankcase with recommended oil. (Drain oil only when engine is hot).

(c) Remove oil filter element, drain and clean filter housing and install new filter element.

(d) Fill oil cup on water pump with same grade of oil as in crankcase.

(e) Oil generator and starter with a few drops of oil. Use same grade oil as in crankcase.

(f) Clean carburetor gasoline fuel screen, and gasoline tank, strainer and sediment bulb.

(g) Check battery water level.

4. Every 100 Hours Operation.

(a) Repeat 50 hours operation instructions.

(b) Drain oil while engine is hot and flush out oil pan with one gallon of cheap light oil (SAE No. 10). *Do not use kerosene.* While flushing oil in crankcase, run engine at idling speed for two minutes. Drain this flushing oil and refill with 6 quarts of fresh oil to the proper level.

(c) Check valve tappet adjustment using a feeler gauge and two wrenches as shown in the picture (not reproduced here). The valve tappet clearances are given on the plate attached to the engine, intake 0.006, exhaust 0.009.

(d) Inspect and remove the carbon deposits from the spark plugs. Examine the porcelain. If it is cracked or chipped either inside or outside, replace the plug. The gap between the electrodes should be 0.025 of an inch. Adjust the side electrode—never the center one.

(e) Inspect the commutator and the brushes on starter and generator: If the commutator is dirty, clean with No. 00 sandpaper. Check brush spring tension. Blow or brush dust and dirt out of starter and generator at the commutator end, with dry compressed air or hand bellows to prevent short circuits, grounding and sticking brushes.

(f) Check specific gravity of each battery cell with a hydrometer. A reading of 1.250 to 1.285 indicates fully charged, 1.230 half charged, and 1.150 dead. Never take a reading shortly after adding water.

(g) Remove cover and check magneto interrupter points. Lubricate felt wick with a few drops of same oil as used in crankcase.

(h) A few drops of oil on governor link joints, governor throttle shaft and carburetor shaft.

(i) Remove plug and apply oil to fan hub of same grade as used in crankcase.

(j) Remove crankcase breather and wash with gasoline.

5. Every 1000 Hours.

(a) Repeat 100 hour operation instructions.

(b) Clean the outside of engine by washing with kerosene, distillate or grease solvent (if the dirt is thick allow it to soak for ten minutes), then wash off dirt with water.

(c) Remove cylinder head, clean carbon, grind and adjust valves. Always replace cylinder head gasket with a new one. See maintenance section (not reproduced here).

(d) Remove oil pan, wash out sludge, if any, and clean oil pump screen. While pan is off, inspect inside of engine to see if oil suction screen bracket is tight, cotter pins and locks in connecting rods and main bearing in place, and make sure all connecting rod bolt nuts and main bearing capscrews are tight. Replace oil pan gasket.

(e) Remove air cleaner and disassemble unit for a thorough cleaning. Wash unit inner screen with gasoline.

(f) Install new spark plugs. Check points to 0.025 inch clearance.

(g) Flush radiator with flushing solution as per recommendation in the section on radiator.

(h) Inspect spark plug cables, battery cables and all electric wiring.

(i) Inspect cut-out relay on control unit as per instructions headed "Voltage Control Unit." Adjust as needed.

(j) Check for air leaks in oil circulating system as per instructions.*

*These instructions are as follows:
Locating Air Leaks.—Air pressure applied to the suction side, or the upper plug on the right-hand side of the engine, should indicate the location of an air leak, and while air pressure applied to the discharge or lower plug on the right-hand side of the engine will sometimes disclose the location of pressure leak, this condition is more readily discovered by fastening to this opening a copper tube which is attached to an oil reservoir which is strong enough to permit air pressure being applied to it. This air pressure will force the oil through the bearings and any loose bearings can be easily discovered by means of the excess oil flowing through the bearings.

(k) Test the compression by cranking the engine over slowly at each compression stroke. If one or two cylinders only lack compression, inspect the valve and tappet clearances on these cylinders before removing the head. Insufficient valve clearance will

cause burned valves and lack of compression. Should the engine show poor compression on all cylinders the valves should be re-ground.

6. Every 2000 Hours, Major Overhaul
(a) Repeat 1000 hour operation instruction.

(b) Completely disassemble engine and inspect all parts for wear, replace parts where necessary.

(c) Clean carbon out of ring grooves of pistons and install new rings.

(d) See maintenance section.

Handle Wire Rope Carefully and Avoid Kinks

Among other useful data and suggestions given by A. Leschen & Sons Rope Co. of St. Louis, in a booklet entitled "Practical Information on the Use and Care of Wire Rope" are the following paragraphs. This matter is copyrighted, and is here used by permission of the publisher.



The Start

A rope should never be allowed to take a position as shown above, but if the loop is thrown out now, the kink can be avoided



The Kink

The damage is done, and the worth of the rope has been greatly lessened, if not entirely destroyed



One Result

Even if the wires are not badly damaged, the rope is out of shape, which will mean excess wear on the displaced strands

Introduction. The correct handling of a wire rope, both before and during its use, is very essential if the best results are to be obtained. Wire rope, like any other piece of machinery, is complicated, and, believing that its use and care are best understood by a manufacturer, we offer the following suggestions and information for the general improvement of all wire rope service.

Unloading and Moving. Reels containing wire rope should not be dropped from cars or trucks, as the weight of the rope is apt to break the sticks on which the rope is wound, thereby permitting the rope to become kinked or mashed. If iron bars are used to move a reel, prying should always be done under the reel flanges and not against the rope.

Storage of Wire Rope. When a shipment of wire rope is not to be placed immediately into service, see that it is stored away in a place protected from the weather and any acid fumes. The outside layer of the reel or coil should be coated with a good lubricant.

"Breaking-In" a New Wire Rope (Also Called "Setting"). When a new wire rope is installed, the machine on which it is used should be run for a while without a load so as to enable the rope to adjust or "set" itself to the working conditions. This is very important, and it applies to all wire rope that moves. If the rope is installed on a mine hoist, the empty cage should be run up and down a few times; if the rope is put on a shovel or similar equipment, the machine should be operated for a while without actually digging. The time lost in breaking-in a wire rope will be well paid for by the extra rope service obtained.

Kinks and Kinking. The kinking tendency of wire rope can be easily avoided if proper care is taken. The accompanying illustrations show how kinks are placed in wire rope, as well as the damage resulting there-

from. It is, therefore, very important that wire rope be kept free from kinks, otherwise the life of the rope will be greatly shortened, even if a sudden breakage does not occur.

Dodge County, Wis., Shop Has Home Made Vulcanizer, Blowout Protector

A special tire patch vulcanizer and an iron frame for protecting workers while testing big truck-tire inner tubes, are among the handy units designed and built out of scrap and stock metal by the highway shop



Showing tubular blow-out protection frame, and tire patching outfit—both made by shop men

crew in Dodge County, Wisconsin. The vulcanizer, shown in the illustration, makes it possible to patch small cuts in 6x16 casings with inner-tube hot patches and liquid cement. The device was fashioned from pieces of discarded steel by means of a little blacksmithing, drilling, riveting, filing and other simple use of their shop equipment.

The blowout protection frame, to which the vulcanizer is attached, was made by welding lengths of iron tubing.

Care of Construction Equipment Tires

By C. T. CARLSON

Sales Engineering Division, Development Department
The Firestone Tire & Rubber Co.

The question of proper tire care for equipment used on graders, scrapers and other types of construction machinery is certainly one of great importance. The important factors to be considered in tire maintenance are:

1. Maintain correct inflation pressure.
2. Avoid over loads on tires.
3. Periodic inspection of tires for cuts, snags or other types of damage which can be repaired, and when found, repairs should be made at once.
4. Maintain speeds at as low a level as practical.
5. Avoid contacts with oils, grease and other materials as far as possible as these items are particularly damaging to rubber.
6. Proper observance of storage re-

quirements when machinery is idle.

In connection with the storage of tires where it is possible to remove them from the equipment, this practice is highly desirable. Such tires, tubes and flaps should be stored in a warehouse which meets the following specifications:

1. Warehouse must be clean.
2. Direct sunlight should be excluded by painting or covering windows.
3. Tires should be piled on stringers to avoid contact with the oiled surface of floors.
4. Tires should be placed flat on floor and not stored in a vertical position.
5. The temperature of the warehouse should be kept as low as possible.
6. Electrical generating equipment

should not be placed in the same room as tires are stored.

7. Circulation of air in warehouse should be reduced to a minimum.

Prior to storing, all tires should be repaired, cleaned, and conditioned ready for use when required. The tubes may be left in the tires in a slightly inflated condition, or may be removed and loosely folded and wrapped in a protective covering of paper, or boxed.

In the event that it is not possible to remove the tire from the equipment, our first recommendation would be to block it up so that no weight is placed on the tire while in storage. The tires should be deflated, and it is highly desirable to have some protective covering over the tire, such as a wrapping of burlap or heavy paper. If the vehicles can not be mounted on blocks and the weight must rest on tires, we would recommend that a regular inspection be made to maintain air pressures at the proper level. Certain protective paints are used for tires which are stored out-of-doors and in many cases these are very helpful in the preservation of tires.

Field Service and Repair Depots for Large Size Tires

From LaPlant-Choate Manufacturing Co.

The shortage of rubber has placed many restrictions on the use of pneumatic tires. Even though you may be working on a defense or vital project, the conservation of tires is important since you may be seriously handicapped in securing replacements promptly.

Tire service and repair is important on your present tires beyond any strict dollars and cents economy. We must make our tires move more dirt than they ever moved before.

LaPlant-Choate calls attention to several factors which will assist its owners in keeping their tires rolling.

Portable Service Stations

Many operators have been availing themselves in the past two years of the portable service stations for oil, greasing and tire service. The portable service station has its place in the contractor's fleet, because it reduces dead head mileage by rolling out to equipment right on the job and serv-

icing "on the spot." Several manufacturers are offering this equipment.

Fleet Valve Kit

Although the service station carries air, oil, grease and water to the equipment on the fill, there was still a need for valve parts and tools. The air service facilities ended at the chuck on the airline. Therefore, a complete valve kit has been assembled to equip the operator efficiently for tire service no matter how remote he may be from a source of supplies. This can be placed in the garage or on the service truck, wherever it will serve the best. The recommended kit is Schrader X-10937.

All items in the kit are in standard usage—the only innovation is the inclusion of a quick-acting coupler to put either a blow gun, a chuck, or a clip-on chuck on the end of the airline.

Repair valves and valve holding tool
Repair connections
Repair chuck parts

Extensions — plus standard chuck, gauges, cores, caps, etc., are some of the parts included. For the operator, the thing to know is that if he has a compressor and airline, this Kit completes the needs on valve service.

Repair Depots

A third point of interest to our operators is the repairing of large tires. Up until two or three years ago, there were only a few places where 16.00s and 18.00s could be repaired. In the past two years, Goodyear has installed 10 major repair points which use a new repair method.

This is the "Kettle" type cure, which has been developed especially for repairing 16.00s, 18.00s, 21.00s and 24.00s. These large tires are placed in a huge steam kettle and repairs vulcanized under high steam and air pressure. This method of placing the whole tire in the kettle means that any number of practical repairs can be cured in one "heat." Under the conventional sectional mold method used on small tires, separate cures were required for each repair.

The overall type repair reduces the cost of multiple repairs and makes practical the repairing of tires damaged circumferentially from scoring by a rock or object wedged in the housing.

Reconditioning of all tires, sectional repairs, reinforcements, "sealing" all small cuts is now possible.

Jig for Welding Shafts and Similar Pieces

The simple but effective device here illustrated in detail was built up primarily to facilitate the welding of broken shafts. By using this jig it is possible to hold the two pieces of the broken shaft in true alignment for welding; and with part of the angle iron that comprises the backbone of the jig cut away, it enables the operator to weld the shaft from all sides, thus holding the shaft from warping during the welding process.

the opening in this angle iron to facilitate welding. This is done by cutting through the angle iron with a hacksaw 2 in. (as per illustration), then using a cutting torch, to remove the sides of the piece thus cut out. The next step is checking the angle iron with a straight edge to make sure it was not distorted during the previous operation. The next step is welding in the two strap iron cap screw brackets (see illustration for dimensions



The jig in service

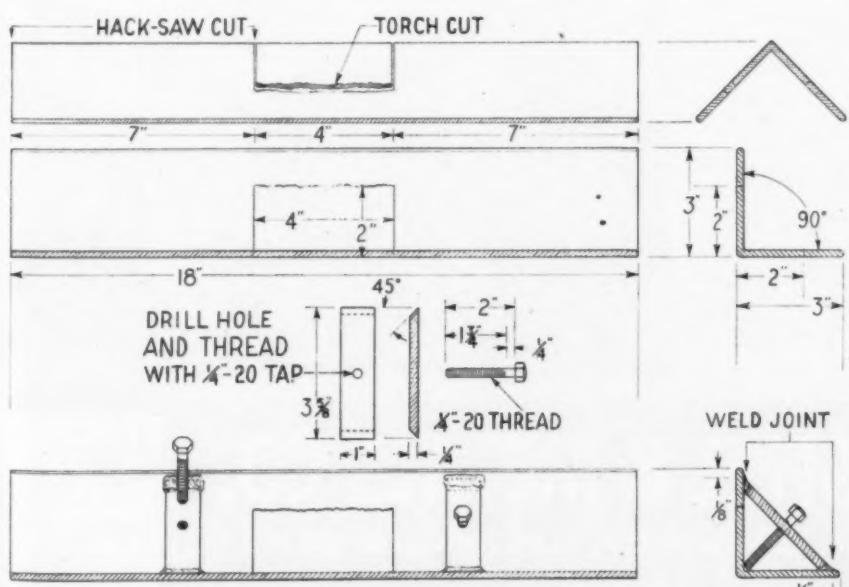
In most cases it would be used for temporary repair only, but being able to fix a machine so that it will keep going is the present all-important job, and to this end the jig is thoroughly effective.

In making this device, it is well to keep in mind that you are making a precision tool, and care should be exercised. A piece of 3-in. angle iron, 18 in. long, is used (as per drawing). The first operation is to cut

and position). These strap irons should be drilled and tapped before welding in place. After they are welded in place, it is well to again check the jig with a straight edge to make sure it is true.

This very practical suggestion comes from Walter Williams, International Harvester Company dealer at Kerrobert, Saskatchewan. The company kindly supplied the illustrations.

WELDING JIG



No. S.T. 2
E-1765-F

Details of welding jig



RED for Light and SAFETY



Red globe DIETZ LANTERNS mean "DANGER — STOP." No other signals or devices so instantly and obviously evoke caution, guide to safety, and prevent needless accidents.

For safety's sake, keep available a good supply of DIETZ LANTERNS with wicks trimmed, and founts filled with inexpensive kerosene . . . ready for service the moment sudden emergencies arise.

Dietz Lanterns burn long hours at a time without diminishment under the most severe conditions.

Note: For diminishment of light during blackouts, Clear or Red Globe DIETZ LANTERNS are recommended when regulated down to low intensity.



1840 R.E. DIETZ COMPANY 1942
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A Word on Tightening Engine Nuts and Bolts

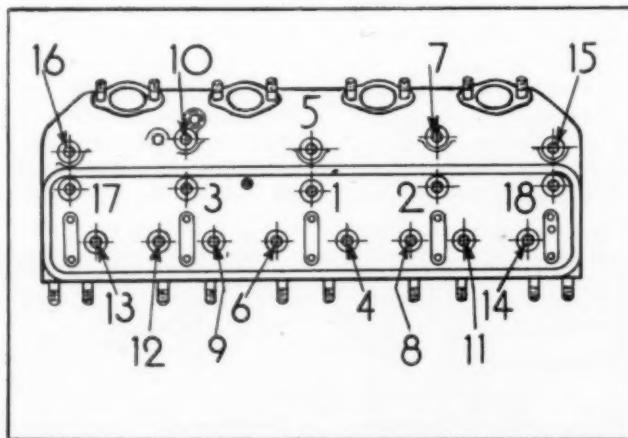
Here are the recommendations of International Harvester Company's engineers for tightening nuts and bolts on cylinder heads and main bearings on three of its models. Although the table of tensions is designed for specific models, it can serve as a guide (to be used with discretion) in work on other engines when the proper tables are not available. The other instructions are of general applicability. The "Serviceman's Guide" for T-6, TD-6 and TD-9 Trac-Trac-Tors is the source of what follows:

Nut and Bolt Tension

When tightening cylinder head nuts on Diesel engines, proceed by first tightening the three center nuts and then cross back and forth as shown by the numbers in the figure. Use a tension wrench whenever possible for tightening cylinder head nuts. The chart below lists the proper pounds tension for each engine. Cylinder head nuts properly tightened to

specific tension when engine is cold need not be retightened when engine is hot.

properly tightened, crankshaft should be free enough to turn easily by hand.



TD-6 and 9 cylinder head nut tightening sequence

When tightening main bearing nuts or bolts, start with the center main bearing and proceed to tighten alternately from side to side working from the center of the case to both ends. When all main bearing cap nuts are

| NUT AND BOLT TENSION DATA (Pt.-Lbs. Torque) | | |
|--|------|------------|
| | T-6 | TD-6 |
| | TD-9 | |
| Cyl. Head | 75 | 80 |
| Conn. Rod | 55 | 65 |
| Main Brdg. | 100 | 125 (5/8") |
| | | 150 (3/4") |
| Flywheel | 65 | 65 |
| | | 65 |

SCRAP IS VITAL to the WAR EFFORT

Millions of tons of scrap steel are wanted for making steel for ships, tanks, trucks and guns. The demand is far in excess of that being salvaged now and unless new supplies are quickly obtained war production is bound to sag.

In behalf of the National War Effort and America's steel producing companies we urge your fullest cooperation in salvaging every available pound of scrap—not only the usual shop waste but all obsolete or discarded steel about the place.

Sell it through the nearest junk dealer or inquire of your local War Salvage Committee. Practice turning in your scrap metal frequently—as long as the war lasts.



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The Research Engineer in Wartime

By HALBERT P. GILLETTE

MANY years ago I wrote a new definition of engineering, namely that it is the application of science in solving problems of economic production. This applies to civil rather than to military engineering, for the problems in the latter profession are mainly those of destruction and defense. The word engineer has the same root as the word ingenious, and great engineers are usually those who are very ingenious. They are the ones commonly spoken of as inventors.

In the last half century, largely because of the example that Edison set, research laboratories, headed by inventive scientists and engineers, have steadily increased in number and in scope. Probably every large manufacturing company now has its research staff. Yet I recall that only 20 years ago a chemical-engineering magazine "roasted" the managers of a great manufacturing corporation for having no research staff.

It is estimated that American corporations have been spending about \$200,000,000 annually in research. This indicates that about 100,000 workers are "researchers." Many of them are more engaged in testing and analyzing materials than in seeking to improve machines or products.

The Bell telephone system has a research laboratory employing 5,000 men and women. This means that about 1 in 80 of the employees of that great organization is engaged in research. Normally there are more than 55,000,000 Americans in gainful occupations, and there is not a single class of occupation that would not profit greatly were at least one percent of its numbers engaged in research. Hence we should have at least five times as many researchers as we now have in America.

The present war is opening many eyes to the need of a great many more scientists, engineers and their assistants in research laboratories. On one war problem 150 physicists are now employed; and it is said that all available physicists will soon be working on such problems.

It should be remembered that many of the greatest inventions have come from the brains of men who had no scientific or engineering school training. Smiles "Self Help" and his "Lives of the Engineers" contain numerous examples of that. One of the

greatest experimental researchers of all time was Michael Faraday. Among other things, we owe to him the first crude dynamo or electrical generator and the discovery of the physical principle on which it rests. He was a book-binder's apprentice when he began teaching himself science from books. He never did learn much mathematics, and late in life he challenged the mathematicians to show how they could have made any one of his great discoveries by the aid of mathematics. It is true that mathematicians did develop his ideas notably, but they had to stand on Faraday's broad intellectual shoulders to see a more distant horizon.

Our patent office came into existence in 1790. In the first 46 years only 10,000 patents were issued. In the following 54 years, the number issued was nearly 400,000. Between 1890 and 1940, nearly 1,800,000 more were issued. Note that the last half century was about 4.5 times as prolific in patents as the preceding half century. Numbers of patents alone do not measure the value of inventions, but they do roughly measure the intellectual activity of our inventive men. The stimulus to this activity that the present war provides is bound to be important. It will be sufficient, eventually, to offset the destruction caused by the war, in every respect but one; and that one—the loss of life and "limb"—is beyond measurement in money.

Special Organization Formed to Salvage Scrap from Structures

An increase in the amount of scrap iron and steel obtained from structures where the cost of demolition exceeds the value of the metals has been assured with the announcement of a working relationship between the Conservation Division's Special Projects Salvage Section and War Materials, Inc., newly organized at the instance of the Metals Reserve Company, a subsidiary of the Reconstruction Finance Corporation.

The Special Projects Salvage Section was established to expedite the movement of iron and steel scrap available in large structures where salvage is impeded by legal, financial, and other obstacles.

Projects will be located and investigated by the field force of the Special Projects Salvage Section of the War Production Board, which also will advise the owner regarding the transfer of title to War Materials, Inc.

War Materials, Inc., will engage and pay contractors to demolish the structures.

Many of the problems that impede the demolition of large structures are other than financial. The Special Projects Salvage Section has, since March, arranged for the movement of 1,800,000 tons of iron and steel scrap,

mostly without financial assistance, except in the case of street car rail handled by the Work Projects Administration. Work Projects Administration is continuing to handle projects of this type but where it does not have labor available, War Materials, Inc., will take care of the demolition.

The Special Projects Salvage Section has solved a variety of problems such as obtaining local bank loans for worthy salvage projects. For instance, slag dumps adjacent to steel mills are being excavated with financial assistance of this sort.

Legal problems also have been solved in many instances by use of the requisitioning power vested in the War Production Board. Other activities have included the salvaging of a number of ships in the Great Lakes; sunken material of all kinds in the Mississippi River and its tributaries; iron and steel from abandoned mines, quarries, city dumps, Indian Reservations, logging camps; abandoned radio towers, bridges, and buildings; rails used to pave grade crossings; oil wells and pipe lines and even such objects as 100 odd wooden ships from World War I, which have been found to contain 100 tons of iron and steel each.

Design and Construction of Flight Strips*

Site selection is of primary importance and since every site has its limitations, thorough investigation and good judgment are necessary to evaluate the advantages and disadvantages of a location.

In nearly every instance, the projects contained in the program submitted by the Army Air Force are designated by area rather than by exact location. Usually an area averaging approximately 100 square miles was shown on a map, any suitable location within the area being acceptable to the Army Air Forces. The latitude which this gave our engineers in selecting sites has made it possible not only to select good sites from a military viewpoint, but, everything being equal, to select sites that will have value after the war for use in civil aviation. Also, it has made it possible to select sites having the best approaches, terrain, soil and drainage conditions as well as proximity to sources of materials and transportation. The effect of these considerations on initial cost and recurring maintenance costs as well as on operational and safety characteristics is obvious.

Each Flight Strip area with its particular topography, drainage, soil, materials for surfacing runways, and other local conditions present a different problem when the selection of site is considered. Information on factors which directly affect operations such as meteorological conditions, direction of the prevailing winds, freedom from surrounding obstructions and other related data must be obtained. Other factors include alignment with respect to approach areas, location with respect to drainage, speed and cost of construction, and accessibility to means of communication and transportation facilities.

In the selection of a Flight Strip site, investigation of suitable construction material on or near the site should be made for economy in first cost and subsequent maintenance. The fact that gravel, sand or stone deposits are available at or near a proposed site may well influence the decision in favor of that site provided the soil and aeronautical features are suitable.

*Abstract of a paper presented Oct. 15 at the fall meeting of the American Society of Civil Engineers.

By FRED SCHNEPFE

Special Engineering Consultant to the Administrator of the Federal Works Agency and Director of the Flight Strips Division, Public Roads Administration

Since Flight Strips have only one runway, it is of particular importance that they be located in the direction of the prevailing winds. This should include "wind-rose" charts and information on fog and smoke conditions affecting general visibility in the vicinity. Sites must be selected where nearby obstructions are not of sufficient height to create hazards, or where provisions may be made for their removal.

Geometric Design

The geometric or dimensional design of the Flight Strip itself is based largely on the operational needs of expected traffic and relates to vertical, horizontal and side clearances, including the length and width of runways, shoulders and end zones as well as approach zone areas.

The approach zone to a Flight Strip runway is a trapezoidal area 500 feet wide at the end of the runway extended, and 4,000 feet wide at the zone limit 2 miles distant. Within this trapezoidal area no obstacles, either natural or man-made, may be permitted which are high enough to stand above a 30 to 1 glide angle projected from the end of the runway extension, and wherever feasible a 40 to 1 glide angle is adopted. In addition to the clearances provided at the approach zones, clearance is required along either side of the Flight Strip and extending above a plane projected on a 7 to 1 slope from the edge of the runway and runway extensions for a zone width of at least 500 feet.

The over-all dimensions of the Flight Strips designed for military use include a normal length of 8,000 feet. However, there may be occasions in which a particularly good site may fall short of this. Such cases, of course, require special consideration. In general the total width of these Flight Strips is not less than 500 feet nor more than 1,000 feet. Nearly all of the present designs call for a width of 500 feet. The paved runway has a width of 150 feet and a length of 4,000 feet at sea level.

This is increased for higher altitudes ranging from 4,000 feet at sea level to a length of 8,000 feet at an altitude of 8,000 feet.

At each end of the paved runway there is a "runway extension" of the same width as the paved runway, usually consisting of some form of soil stabilization. The purpose of these extensions is to provide additional runway length, at low cost, for the planes that may require a runway longer than that which is paved. The shoulders on either side of the paved runway have a width of 175 feet and extend for the entire length of the paved runway and runway extensions. On certain projects portions of the shoulder areas for a length of 6,000 feet (at sea level) are stabilized, surface treated with bituminous material, or turfed.

Runway and shoulder grades are relatively flat. The maximum transverse runway grade is 1½ percent, with a minimum slope of 1 percent. The one percent transverse grade is considered the more desirable. Runways may have one-way or two-way transverse slopes. Where a two-way slope is used the surface is made up of two intersecting planes. Parabolic or circular crowns are not used. This is to avoid the possibility of water standing in the central and most used portion of the runway. The maximum transverse slope of shoulders is one percent, with a minimum desirable slope of five-tenths of one percent. In no case do shoulders slope toward the runway. The maximum longitudinal grade of runways is 1½ percent. However, if feasible, one percent should not be exceeded. A considerable number of projects have an unbroken longitudinal grade throughout the runway and runway extensions. Where changes in grade are used the maximum rate of change is ½ percent per 100-foot station. Vertical curves preferably have a length of 500 feet with a desirable minimum of 300 feet. Every effort is made to obtain longitudinal tangent intervals between vertical curves of not less than 1,000 feet. Sight distances along the runways are so designed as to permit an unobstructed view for their entire length as determined from a pilot's eye at an elevation approximately 10 feet above the runway surface.

Structural Design

Structural designs relate largely to the type of surfacing used on runways and shoulders to accommodate expected traffic. An important consideration is to design a subgrade of sufficient and uniform bearing power. At each location soil studies are conducted to determine the bearing values of the natural subgrades. Any deficiencies are corrected before pavement construction is undertaken. The thickness of the prepared subgrade will depend directly on the maximum loads it is to support and the bearing value of the material used in its preparation and indirectly on climatic conditions.

In no case are designs for runway pavements based on a wheel load of less than 12,500 lbs. In all cases they are safe for much greater loads or easily may be strengthened to carry the heaviest planes.

Impact

For a number of years it was standard practice to add an impact factor to the static wheel load. Now it is believed that the critical load may be that imposed by the wheels of the standard plane rather than the sudden forces developed during operating maneuvers. The force exerted against a runway pavement by the wheels of a standing airplane can be determined without difficulty but when a plane is in motion, either in preparing to take off or as the wheels make contact in landing, the force developed by the wheels on the runway is very difficult to determine. It has been observed that surfaces of the flexible type, including the various bituminous treatments which satisfactorily sustain the weight of standing airplanes, do not fail structurally under the forces developed by the same airplanes in motion. Consequently, at the present time there is a definite trend away from the use of any impact factor whatever.

The maximum wheel load of the airplanes of today is several times greater than the maximum wheel load permitted by law on highways. The size of the tire used on the landing wheels of airplanes is correspondingly greater than those used on motor vehicles. There are other important differences between the motor vehicle and the airplane with respect to their effects on pavements. For example, the time duration of stress from dynamic loading is probably appreciably less in a runway than it is in a highway, and finally, the frequency of load repetition at a given point in a highway

pavement is much greater than on a Flight Strip. Consequently, it seems unnecessary to consider fatigue of the concrete as a factor in structural design of rigid pavements for Flight Strips.

The structural strength of a given type of pavement is dependent on its thickness and support. For flexible type surfaces the thickness of the wearing surface, base course, and subbase considered as a unit, are predicated in part on the observed behavior of soils in highway and airport construction, and in part on such results of research as are available. Quite recently the Public Roads Administration published an article entitled "Classification of Soils and Control Procedures Used in Construction of Embankment," which may be used as a guide in studying soil characteristics and their classification as related to thickness of flexible type pavements. For a number of years the State Highway Department of California has investigated the design and service of flexible type pavements on highways in that State and they have developed a method of designing the bearing capacity of flexible type pavements which satisfactorily has met their needs. In June of this year the War Department, Office of the Chief of Engineers, published Chapter XX of their engineering manual entitled "Design of Runways, Aprons, and Taxiways at Army Air Force Stations." The brochure contains curves, illustrations, and data for designing flexible type pavements based on the theory and practice developed in the State of California. It seems likely that this brochure and the methods developed in California will go a long way toward clarifying the design principles as applied to flexible type pavements. The thickness of such surfaces will, of course, depend largely on the character of the material used in their construction and the bearing power of the subgrade on which they rest. For the heavier wheel loads and the soils of low bearing value a total thickness of as much as 24 or 30 inches may be required, whereas for the lighter loads, higher type surfaces and soils of high bearing value as little as 6 to 10 inches total thickness may be adequate. Bituminous wearing courses on flexible bases are seldom less than 2 inches in thickness.

Engineers are in agreement that during the emergency the use of steel in concrete pavements should be limited to the minimum compatible with sound engineering procedure.

This policy is being adhered to in the Flight Strips program.

Drainage

Drainage of Flight Strips is a major problem, but a relatively simple one when compared with the drainage of airports having a number of intersecting runways. On many airports subdrainage structures must be provided to intercept and remove storm water, to drain water from seepage planes in the soil and to lower the water table. In such cases drainage becomes an important factor in the cost of airport construction. In the case of Flight Strips the problem is considerably simplified and drainage structures may be entirely eliminated or used only to a minor extent. On them, runoff resulting from rainfall or melting snow flows across the runway pavement and shoulders to shallow open ditches along the outer edges of the area.

Where storm drains or subdrains are needed along the edges of runways, open joint or equally suitable pipe is placed in a trench and back-filled with gravel or crushed stone to a point 12 inches below the top of the trench. The top 12 inches is composed of coarse stone premixed with bituminous material firmly tamped or rolled into place. This prevents displacement by wheels and the blast of propellers and serves also as a transition strip for aircraft passing from the relatively rigid runway to the softer shoulders.

Shoulders

Shoulders adjoining the paved runway of a Flight Strip vary from a normal highway shoulder and must be treated accordingly. While the shoulder in no case should be less than 150 feet wide, it is not always necessary that mechanical stabilization be carried the entire width; ordinarily, stabilizing would be carried from about 75 to 100 feet from the edge of the runway. The shoulders of Flight Strips bear the same relation to the paved runway that the shoulders of a road bear to the paved roadway. Shoulders are primarily "run-over" areas and the portions adjacent to the runway will have more traffic than distant portions. It is, therefore, apparent that the greatest stabilization should be adjacent to the paved runway and may decrease from that point to zero as the ditch line is approached. Generally, a uniform depth extending from the edge of the runway across the shoulder for a width of 50 to 75 feet and then decreasing as it ap-

proaches the outer edge of the shoulder will be found suitable.

Over stabilized and unstabilized areas it is frequently desirable to either seed or sprig when the soil and general weather conditions are such that grass will grow. Where grass will not grow an application of a bituminous dust layer may be used. Where shoulders, runway, and runway extensions are surfaced or treated with bituminous material there should be a stripe painted around the runway to distinguish it from less substantial areas. Runway visibility may also be obtained by using a finish of light color aggregate on bituminous surfaces.

Fences

In some instances fencing is erected at boundaries of Flight Strip areas to prevent hazards to aircraft from grazing animals and trespassers.

Construction Methods

The principal construction operations are clearing and grubbing, grading, drainage and paving. Of these items, grading and paving are the most expensive, consume most of the time and are most important to the successful operation of the Flight Strip.

A large portion of the Flight Strip area is composed of embankment. During the emergency runway pavements are likely to be placed immediately, or shortly after the embankment has been completed. Therefore, every effort should be made to secure optimum compaction to fill material and thus avoid subsequent settlement and damage to pavement.

Construction of Pavement

Methods used in the construction of flexible type bases and surfaces follow those developed by the State highway departments in cooperation with the Public Roads Administration, and they represent best current practice. A number of types of bituminous surfaces can be satisfactorily constructed with local aggregates. Examples are sand asphalt pavement and several types of open and dense graded bituminous mixtures. One type commonly used on Flight Strips is the plant mixed bituminous surface laid to a minimum compacted thickness of 2 inches. Other acceptable types are extra heavy surface treatments not less than $1\frac{1}{2}$ inches in thickness for relatively light traffic, penetration macadam, roadmix, or mixed-in-place surfaces. These pavements are well known and a description of them is not considered essential.

Fire Truck Maintained by Four Townships

NOT too many unincorporated rural areas have adequate fire protection, but an exception to the general rule is found in the cooperative arrangement of the townships of Algoma, Uekimi, Oshkosh and Utica adjacent to the city of Oshkosh in Winnebago County, Wisconsin.

These townships own the modern truck here pictured. It consists of equipment from the Howe Fire Apparatus Co., of Anderson, Ind., mounted on an Oshkosh chassis. The sheet iron tank on top is an adjunct which is used under certain conditions as an intermediate reservoir, or sump, for pumping. The side of the truck

bears the inscription, "A.N.O.U. Rural Fire Dept."

The outfit is kept in the Winnebago County Highway garage near the Oshkosh city limits, and is operated by one of the county's regular garage mechanics. There are three such men, working in consecutive 8-hour shifts. For storage and for operators' time the county charges \$50 per month. Additional volunteer help is picked up as the truck responds to an alarm.

All alarms are by telephone. Special equipment is maintained in the office to assist in locating the fire on a map and determining the best route to take to it.



A.N.O.U. Rural Fire Dept.'s Truck with Operator John Gulig beside it

New Regulation for Construction Price Control

(Continued from page 46)

construction industry — repairs, improvements, remodeling, and new construction work for residential, commercial, industrial, sanitation, communications, transportation, flood control, power development, reclamation, and other similar projects or services.

Other high points of the order are:

Bonuses: Prohibited except upon specific approval of the Office of Price Administration.

Certificates of Compliance: Mandatory in sales of more than \$500; may be demanded by purchaser in sales of less than \$500.

Enforcement: The criminal penalties civil enforcement actions, license suspension proceedings and suits for treble damages provided in the Emergency Price Control Act of 1942 are applicable against violators. There is a sharp prohibition against evasion.

Licensing, Registration: Operators licensed as a condition of doing business as of effective date of order may be required to register.

Records: Must be kept available for the Office of Price Administration examination.

Petitions for Adjustment: May be sought by contractors engaged on Government contract, or sub-contract, who believes the regulation threatens to impede production of any essential war commodity.

Three More States Protect Road Funds

Citizens of Iowa, Oregon and West Virginia voted overwhelmingly in the general elections of Nov. 3, to amend their state constitutions to require that all special highway taxes be spent for highway purposes. This increases to 14 the number of states having constitutional requirements that all special highway taxes be dedicated to highway purposes.

Editorial

Report from Washington

After spending two days in Washington, D. C., and listening to President Roosevelt, Donald Nelson, Paul V. McNutt, and Generals Hershey and McSherry, I came away with a better realization of the tremendous job to be done in the conducting of this war and the magnitude of some of the problems.

Manpower is probably one of the most important. While it is not pressing at the moment it is going to become more acute next year. Plans and policies will have to be made because we are approaching "the bottom of the barrel." Women are going to be needed more and more to fill positions left by men taken into the army. Transfer of skilled help from non-essential industries to essential industries must take place. Something will probably be done about enlistments into the armed forces. Skilled mechanics working in airplane, tank and other factories have already enlisted thus depleting the skilled help in these factories, and in some cases slowing up production. Under the selective system some of these men might never have been drafted, for they would have been regarded as more important in production, while in other cases a new man would have been trained for the job before induction of the old one into the army or navy. Another serious problem is the piracy practiced by certain companies in offering higher wages and so drawing help away from others. In this category is also the migration of labor from essential war industries to non-essential.

In order to take care of these manpower problems, the United States has been divided into regions or areas. A director has been appointed for each, and a management-labor committee composed of business men and union leaders has been set up to cooperate and work with the regional director.

It has been felt that there is a big need for price stabilization, and as we all know, this has already been put into effect on wages. The next step is the simplification and standardization of war production. It is hoped that this can be done with the least

impact on business. There is a materials shortage in certain items, and it is expected that by simplification and standardization these shortages will be eliminated as far as the war effort is concerned. Already this has been accomplished in the case of aluminum. The arrangement under which this is done is known as "The Controlled Materials Plan." It takes care of the scheduling of material for lend lease, construction, army and navy programs. It supplements in many cases, and in other cases eliminates, the present priority system. Under it a manufacturer's needs in materials will be figured for three months in advance, and when they have been passed upon, the plan will enable the manufacturer to receive material when he needs it.

Each manufacturer is going to be required to make up his bill of materials and to state exactly when he requires them, so that there won't be any hoarding and there won't be any shipment of materials before they are needed. In some cases this plan may even help manufacturers engaged in producing items non-essential to the war effort, because if it is found that there is enough material to satisfy war requirements and there is material left over, it can be distributed among other manufacturers. However, it is going to be absolutely necessary to see that there is enough material for those manufacturers engaged in producing products essential to the war effort and their needs must come first. This plan has the backing of Donald Nelson, Ferdinand Eberstadt, William L. Batt, and others.

E. S. GILLETTE

Dehydrating the Fruit of Knowledge

FROM the time we lisp our first till death ends our last words, our tongues and our blood-pumping hearts are muscular rivals.

The happiest hunting-ground for writers suffering from verbal-degeneration of the intellect is the daily newspaper. Theirs has been the daily task of keeping so-and-so many lineo-

type operators from going on relief. Their's also the glory that comes from our national consumption of millions of tons of wood pulp annually.

Yet newspaper publishers are not without rivals as patrons of the art of concealing a speck of radium in a ton of rock. Even our best general magazines hire writers on the "cash and carry" basis. The writer gets the cash and the reader carries the resulting verbal load.

As a cub-editor the present writer received his first call-down for spending three weeks reporting a field assignment, the harvest of which had been too few pages to suit the chief editor. Yet a little later the same chief editor praised the same cub-editor for condensing a research monograph into one-tenth of its original length. That also took three weeks. When the chief editor had before him a means of definitely measuring the amount of "dehydration" effected, he appraised the value of the work correctly.

There is no way of dewatering an article so effective as rewriting it several times. This may mean a headache for the writer, but it will be he and not the reader who will take the aspirin.

"Who's Who" and Why

"WHO'S WHO IN AMERICA" recently recorded its 44th birthday when it published the biographical sketches of some 32,000 Americans. In the first edition 8,600 sketches appeared. Only 350 of those old timers are still in "Who's Who." Not all the rest have died, for many were office holders who automatically were dropped when they ceased to hold office and many others also were dropped out because they have ceased to be in the lime-light. Thus Marie Dressler's sketch disappeared in 1925 when her career as a stage actress seemed to have ended, but back it went in 1932 when she became a star of the screen.

The name of this "hall of fame" suggested itself to A. N. Marquis, a young Chicago publisher, when he chanced to pick up a British court guide called "Who's Who." That was a striking title, and it fitted in with

an idea that he had entertained of publishing a sort of dictionary of Americans whose ability had won them prominence or at least publicity. His modesty has kept his own name out of "Who's Who" all these years, although he sold it some 26 years ago.

To be eligible for this "hall of fame" hereafter one must be more than an athlete, however "great" in sports. The editors recently decided that neither muscular skill nor stamina would be regarded by them as giving a man distinction of the sort that should be chronicled in "Who's Who." As to the wisdom of this, our chief editor, himself a "Who's Whoer," is in doubt. The fact that a goodly number of the 32,000 "celebrities" in the book are not a hundredth part as famous as are many athletes. Such a book is usually consulted to find facts about some person whose name appears frequently in articles or over the radio. What matters it whether his mimicry, his pole-vaulting or his authorship got him prominence? Perhaps less brains went into writing a best seller than into becoming able to top a bar at 16 feet. In any event, there can not be 1 in 20 of the 32,000 whom fame would crown for great intellectual achievement.

The qualifications of 200,000 have been examined and 3,500 new names were selected for the 1942 edition. For

every American listed there are about 4,200 who are not; and of those listed only 1 in 16 is a woman. The average biographical sketch is about 100 words long and usually it is an autobiography. Dr. Nicholas Butler—"Nicholas the Miraculous"—president of Columbia University, takes first prize as to the length of self-portrayal, with 129 lines of small type. Vice-President Wallace finds 18 lines sufficient, and—John D. Rockefeller, Jr., is satisfied with 17. Shirley Temple is the youngest at 14, and Brigadier General William Henry Bisbee, at 102, is the oldest.

When a member of the "Who's Who" aristocracy goes to that realm where autobiographies are taboo, the list of his earthly achievements is dropped from the following edition of "Who's Who." Since Samuel Untermeyer has joined that mighty throng, we shall not hurt his feelings by quoting what H. L. Mencken once said about the "Who's Who" sketch of Samuel's life, namely that it contained "everything of interest about the hon. gentleman save his fingerprints and the number of his watch."

By the way, if you happen to want to know the date of birth, degrees held, books written, clubs joined, wives married, children begotten, by any of the 32,000 elect, chances are your town's library has this book that tells it all—or at least all that its 32,000 authors cared to tell.

ance land acquisitions at the request of state and local governments.

6. Continuing evaluation of the economic results of regulatory practices including changes in rate levels, quality of service and competition.

Discussing public responsibility for basic transport facilities, the report says, in part:

"The basic facilities for highway, waterway, and air transport are publicly provided. A strong public demand by a transport-conscious people has resulted in a great development of these facilities and their progressive improvement and modernization in keeping with technological progress. * * *

"In sharp contrast, the privately owned railway plant is in the main dependent for its modernization and improvement on access to private investment markets. * * * In consequence, the railroads are barred from participation in public works and development programs, and likewise, they are excluded from public plans embracing physical coordination with other forms of transportation."

On the question of highway financing, the report recommends:

1. State-wide systems of highways specified in each state to be financed entirely through motor vehicle taxes.

2. Federal highway aid to be provided through a *Federal tax on gasoline* the proceeds of which would be returned to the states on a need basis.

3. User charges are a means of raising revenue but do not provide an automatic guide to investment. Computation of costs and benefits must be made to determine economic justifications of transportation projects.

Concerning work relief projects the report says: "In the public promotion of transportation facilities make-work programs to provide employment should be replaced in future emergencies by public works designed not merely to conserve human resources but to accomplish, on the basis of engineering and economic criteria, the maximum amount of public improvements."

Many thousands of miles of little-traveled roads "have no legitimate claim for improvement with public funds," the report says. It also declares that the magnitude of highway needs in and around cities requires the expenditure of more state and Federal funds in these areas.

The report—"Transportation and National Policy"—was prepared under the general guidance of Owen D. Young, Chairman of the Advisory Committee appointed for the Study.

New Over-All Federal Transportation Agency for Post-War Period Recommended in Report of National Resources Planning Board

Post-war establishment of "A National Transportation Agency" under legislative direction to coordinate Federal transportation activities and absorb "existing development agencies" as divisions of the new authority, is among major recommendations of a National Resources Planning Board report transmitted to Congress by the President, Nov. 5.

The National Transportation Agency would "undertake leadership in programs for *transport consolidation, terminal unification and reconstruction, coordination of the various transport media*, and encouragement of the development of new forms of transport within their respective economic spheres." Cooperation of regulatory agencies is called for "but the National Transportation Agency would be responsible for the unification of the Federal Government's planning, development, and adminis-

trative functions in the field of transportation."

The report recommends unified terminal facilities to serve coordinated systems as "a logical public responsibility." Among other recommendations are:

1. Extension of Federal Government credit to railway modernization and improvement which "may be included in public works programs."

2. Railroad consolidations.

3. Planning by the highway transportation industry, the Federal and state governments for *redesign of automotive equipment along functional lines and modern inter-regional highways and urban express roads*.

4. Major emphasis on off-street parking facilities in urban areas.

5. Immediate authority for the Federal Government to acquire and fin-

The Borrow Pit

¶ A London barber cleaned up the rubble left by a near bomb hit, and declared himself open for business with this message: "I've just had a close shave; how about you?"—*Illinois State Register*.

¶ Brown: "I want you to reseat this pair of trousers you made for me. You know I sit a lot."

Tailors "All right, but I hope you brought the bill to be receipted. You know I've stood a lot."

¶ "Yassah," said old Link, "Business very good. Done bought a pig fo' ten dollars, traded pig fo' a barrer, barrer fo' a calf, calf fo' a bicycle, and sol' de bicycle fo' ten dollars."

"But yo' don' make nothin, Link."

"Sho' 'nough, but look at de business ah been doin'."—*Montreal Star*.

¶ Rastus: "Yo' done said yo' could lick me?"

Moses: "Uhuh, Ah sho' did, big boy. Want me to demonstrate?"

Rastus: "No, indeedy. Oh's jes' gatherin' statistics."—*Road Machinery News*.

¶ Sign seen in a Chicago tavern: "Do not go outside during a blackout, you may be half lit."—*Chicago Tribune*.

¶ A girl met an old sweetheart and decided to high hat him.

"Sorry," she murmured, when the hostess introduced him to her. "I didn't get your name."

"I know you didn't," rejoined the old flame, "but you tried hard enough."—*U. S. S. Pennsylvania Keystone*.

¶ Joe—Did you say your girl's legs were without equal?

Jack—No, I said they were without parallel.—*The Bee Hive*.

¶ The historic college professor met a friend in a street some distance from his college's campus and stood and chatted with him for some minutes. As the friend prepared to leave him, the professor exhibited signs of uncertainty.

"Please," he said at last. "Will

you tell me this? When I met you, was I walking this way"—pointing—"or that?"

"That way, professor," said the friend.

"Ah, thank you," said the professor. "Then I must have had my luncheon."

¶ Policemen, tired of directing home canners seeking more sugar to the rationing office, across the hall from the police station, hung a sign on the door:

"Sugar lady in here."—*Baxter Springs, Kans.*

THAT'S "TELLIN' 'EM"



Standing out all by itself on "the wild prairie," the meaning of this sign can scarcely be mistaken no matter the manner of spelling.

¶ The drunk weaved up the avenue and staggered into a beauty salon. "Hello," he said, "ish thish the beauty shop?"

"Yes," replied the receptionist, "this is the beauty shop."

"Well, bring me out one," sputtered the souse, "I'm lonesome."

THE HARD DIRT ROAD

¶ Upon the slope were two grey grey bands,
Tapering mysteriously—
A sailor pictured double-strands
Of hemp that drew him to the sea.

A doctor thought of tape that bound
A world of conflict and decay.
His reaping done, an old man found
The road a friendly, homeward way.
But one who bore too heavy a load
Walked on a road, a hard dirt road.

—*Frank Cheavens in the Texas Outlook*

¶ There was a crash, and a ball came sailing through the kitchen window and landed at the housewife's feet. She quickly rushed to the door, only to find the street deserted.

About half an hour later a timid knock came on the door, and the scared voice of a small boy said: "Please, ma'am, here comes father to mend your window."

Looking up the road, she saw a man with a piece of glass approaching the house, so without further ado, she returned the ball to the boy and praised him for being so honest.

It did not take the man long to repair the window. Then he turned to the housewife.

"That'll be \$1.50," he said.

"What!" she exclaimed. "Wasn't that boy your son?"

"Bless you, ma'am," said the glazier, "ain't you his mother?"

¶ Two negroes who had not seen each other in five years discovered each had been married during that time.

"What kinda woman did you-all get, Mose?" asked Rastus.

"She's an angel, Rastus, dat's what she am."

"Boy, you sho is lucky. Mine is still livin'." Rastus muttered.

¶ "Miss Epsom," said the colored parson impressively, as he led her into the brook for baptism, "I'se gwine to lead you inter dis heah stream and wash out every spot o' sin you's got!"

"Lawsy, pahson," giggled the erstwhile frolicsome damsel, "in dat li'l ole shallow creek?"

¶ A young matron of our acquaintance taking first aid training had reached the resuscitation stage. One evening on a darkened street she observed a man sprawled face downward. "Aha," thought the young matron, "Providence has sent me hither to minister to this poor unfortunate." Parking her car she rushed over and began the resuscitation treatment. Presently he stirred and looked up. "Lady, I don't know what the hell you're up to, but I wish you'd quit tickling me. I'm holding a lantern for this guy working down in this manhole."

About Contractors and Their Jobs

Kansas City Area

REPORTED BY

PAUL L. MATCHETTE

The Alaska Highway is being built by a Missourian, a native of Boonville, Missouri, Brig. Gen. William M. Hoge. General Hoge, who is the administrative and planning genius at the head of this war job of building the Alaska Highway, was born in Boonville, Missouri, January 13, 1894. He spent his boyhood in Lexington, Missouri. He attended Wentworth Military Academy. Wentworth Academy is located approximately forty miles east of Kansas City, on U. S. Highway No. 24. After graduating from Wentworth, he attended West Point, where he graduated with honors 29th in a class of 125, which permitted him to enter the Engineering Corps.

General Hoge's record as an Army Engineer has been exceptional. He won the Distinguished Service Cross in the First World War. He was one of the group of brilliant officers who helped to harness the Missouri River Channel after the war.

General Hoge is well known in Kansas City, having spent considerable time here in the U. S. Engineer Corps. His many friends are watching his progress with interest.

Kansas City, as well as other cities throughout the Southwest, is having its problems in regard to increased expenses and diminishing tax returns. It is estimated that the cost of operating the city for the next fiscal year, will amount to approximately \$582,000 over and above the cost of operating

the present fiscal year. Here are some of the expected losses in revenue this fiscal year ending next April 30, 1943, and the following fiscal year, 1943 and 1944.

| Source | 1942-43 | 1943-44 |
|-------------------------|-----------|-----------|
| Parking Meters | \$ 10,240 | \$ 27,040 |
| Personal Tax | None | 63,000 |
| Merchants Tax | None | 19,000 |
| Prior year levies..... | None | 8,850 |
| Drivers' Licenses | None | 12,500 |
| Occupational Licenses. | 21,500 | 49,000 |
| Fines, Penalties | 32,000 | 87,000 |
| Public Works | 35,000 | 74,000 |
| Gasoline Tax | 93,000 | 253,000 |
| Total expected | \$191,740 | \$593,390 |

According to city authorities, experience in the areas where gasoline rationing has been in effect, indicates that a 60% reduction in consumption may be expected. It is also estimated that a reduction in parking meter collections will amount to around 40%. The expected decline in valuation on automobiles through one year's depreciation is approximately 36%.

Already Fines, Forfeitures and Penalties in the Municipal Court for traffic penalties, such as speeding, etc., are down about 18%, and with the new national speed limit of 35 miles per hour, along with gasoline rationing, these are expected to decline still further.

Arthur C. Everham, Director of Public Works, and Reed McKinley, City Engineer, are doing everything they can to make both ends meet in the Public Works Department.

The Federal Airport Approval Board, composed of the secretaries of war, the navy and commerce, recently approved an expenditure of

Wanted—Your Ideas!

As the Treasury Department's special six weeks' War Bond Payroll Savings Campaign progresses from November 15th to New Year's Day, the War Savings Staff is anxious to secure as many ideas as possible on how different companies are planning to put across their individual drives for 10% of payroll.

These ideas in turn will be passed on to other companies to aid them in reaching the mutual objective before New Year's Day.

The continued success of the War Savings Campaign depends on the Payroll Savings Plan, which has

proved the most effective means of insuring the systematic purchase of War Bonds by millions of workers. Consequently, the War Savings Staff is trying to complete the job of signing up every wage earner for 10% through the Payroll Savings Plan not later than the first day of 1943.

Help the national campaign, first by putting over the drive in your own company, and then by telling the War Savings Staff how you did it. Send this vital information to Payroll Savings Division, War Savings Staff, Treasury Department, 709 12th Street, N. W., Washington, D. C.

2 million dollars for further work on the Kansas City-Grandview Airport. Last spring, the City of Kansas City, Missouri, purchased 981 acres of rolling land located on U. S. Highway No. 71, eight miles south of the southern city limits, or approximately 17 miles south of the center of the city.

At the time the purchase was made, the contract was let for the grading to Perry McGlone, grading and paving contractor, City Bank Building, Kansas City. The grading is now practically finished and work is getting under way in the construction of the runways, buildings and utilities.

The north-south runway will be approximately 7,000 feet long. Other runways will vary in length up to 4,000 feet. The city plans to make this Grandview Airport one of the best passenger and freight airports in the country.

A few miles southeast of this Grandview Airport is a small community named Greenwood. In this location, Jackson County authorities are planning a new airport similar to the Grandview Airport. Tentative plans have also been drawn up to construct still another airport in the east industrial section of Kansas City. Besides these airports under construction and contemplated, the Kansas City Municipal Airport, only five minutes automobile ride from the downtown section, and the Fairfax Airport, bordering on the north boundary of Kansas City, Kansas, along with the Gardner Naval Airport, near Gardner, Kansas, approximately 25 miles southwest of Kansas City, consisting of the base airport and ten satellite ports, assures Kansas City its place in the air transportation in the immediate future.

Maguire and O'Brien, 255 Union Station Building, Kansas City, Missouri, is the new company succeeding Cook-O'Brien Construction Company, one of the oldest railroad contracting firms in this area.

Luke O'Brien was associated with his brother, Emmett, and with A. L. Cook, of Ottawa, Kansas, for many years, in the building of railroads, the grading of highways and the paving of brick and concrete roads and streets.

M. D. Maguire is one of the outstanding contractors in St. Louis. John I. Carroll, for many years with Welch-Sandler Sand Company, Kansas City, is associated in the company. All of these men are well known in the construction industry. Their many friends wish them success.

Bushman and Son Construction Company, 1801 South 8th Street, St. Joseph, Missouri, have handled an excellent contract for grading and paving on an Air Force installation in Nebraska. Joe Bushman is one of the veteran highway contractors in Missouri and Kansas. He originally started building bridges for the Missouri State Highway Department. This company is now considered one of the best now operating in the state.

H. E. Newlin and R. F. Newlin have sold their interest in the Shaw-Newlin Company, Allis-Chalmers dealers, Chillicothe, Missouri, to O. B. Shaw. The new company is known as Shaw Sales and Service, Highway 65 South, Chillicothe, Missouri.

The new company will handle the same line of road machinery which they previously handled. Mr. Shaw is well liked throughout the state. He is a hard worker and is bound to be successful. Both Mr. H. E. Newlin and R. F. Newlin are interested in the Newlin-Mosbacher Company, 641 Southwest Boulevard, Kansas City, Kansas, distributors for Allis-Chalmers Tractors and Equipment for the Kansas City Area.

Before entering the tractor business several years ago, Harve Newlin was one of the leading automobile dealers in Kansas. He has built up a large following in the construction field.

Grant Stannard, Stannard Construction Company, 434 North Rock Island, Wichita, Kansas, and Sandy Hites, L. V. Hites Company, City Bank Building, Kansas City, Missouri, have a large airport job near Herington, Kansas. Otto W. Knutson, Otto W. Knutson Construction Company, 3527 Broadway, Kansas City, and Mike Haase and Son, 2027 Swope Parkway, Kansas City, Missouri, are working with Hites and Stannard on this job. Rhoades Construction Company, Newton, Kansas, have the contract for the drainage.

Less Hayes, L. W. Hayes Company, Bethany, Missouri, and Royce Zink, Royce Zink Construction Company, Appleton City, Missouri, are producing a large tonnage of crushed aggregate for Mike Haase on a job near Manhattan, Kansas.

The new Cantonment now building southwest of Salina, Kansas, in Saline County, has been named Camp Phillips, by the War Department. The name is in honor of Col. William

M. Phillips, who was one of the founders of the city of Salina, Kansas, in 1858.

H. J. Hall, H. J. Hall Construction Company, 5622 Reeds Road, Mission, Kansas, a suburb of Kansas City, has recently been awarded a contract for building an airport near Gage, Oklahoma. Herbie Hall is one of the pioneer grading contractors in Kansas. He is a graduate engineer, and at one time was connected with the Kansas State Highway Commission. The Valley Engineering Com-

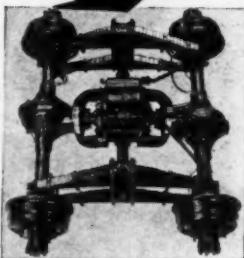
pany, of Oak Park, Illinois, will lay the hot asphalt on this job with their Barber-Greene Hot Asphalt Plant and Finishing Machine. This company built the Dodge City, Kansas, CAA Airport last spring. The Valley Engineering Company is owned by Andy and Wilson Jaicks.

Many of their Kansas City friends will remember them when they lived in Kansas City and were associated with their father in the Jaicks Construction Company, a large paving company that operated throughout the Southwest.



WHAT A JOB! ALL THAT MEN AND MACHINES CAN GIVE!

Here is an accomplishment that is enough to make the old Sourdoughs turn in their graves. Under the urgency of war the unbelievable is being accomplished in record time. Doing their share is a big fleet of trucks with heavy-duty dump bodies and—



THORNTON FOUR-REAR-WHEEL DRIVE

You may not be building an Alaskan highway, but you may be building an airport runway or a vital road, or you may be hauling logs or other heavy loads that are essential today. You need **BIG-CAPACITY, HEAVY-DUTY TRUCKS.**

Standard heavy trucks are not available—but don't let that stop you. In the U. S. A. and all over the world 1½ to 3-ton trucks have been converted to husky heavy-duty vehicles that do the job better and cost less. Act quickly while Uncle Sam still approves. Contact your nearest Truckstell-THORNTON dealer or wire the factory direct. Trained men will engineer this equipment right to your **PARTICULAR JOB.**

Put **TWO** driving axles under the load instead of one, double the gear speeds, improve springing and load flotation, gain vastly superior tractive ability.

THORNTON TANDEM CO.
8721-8779 GRINNELL AVE.

DETROIT, MICH.

Manufacturers also of the THORNTON automatic-locking DIFFERENTIAL

"When you need TRACTION you need THORNTON"

Personal Items About Engineers

Ferd S. Williamson, County Engineer for Morris County, Council Groves, Kansas, has taken a temporary leave of absence and is working on a war project as civil engineer.

Walter V. Thomas, is the new county engineer, with headquarters at Leavenworth, in Leavenworth County, Kansas. Kenneth Stone, former county engineer, resigned recently to enter the armed services.

Ira E. Taylor, Former Engineer of Maintenance, Kansas State Highway Department, has recently been commissioned Captain in the U. S. Engineer Corps of the Army. He reported for duty at Omaha, Nebraska, October 20.

Ira Taylor was an exceptional Maintenance Engineer in state highway work. He did a fine job for the Kansas State Highway Department, of which he was a member for 12 years

prior to 1937, at which time he had an opportunity to enter the construction field as a member of the Dan Scherer Construction Company, with head offices in Kansas City, Kansas. Last April, he entered the Army with the U. S. Engineers, at Fort Leonard Wood, Missouri.

All of Ira's friends will be glad to know of his promotion and with his ability we predict that many promotions lie ahead of him.

Lt. Col. Bruce D. Rindlaub is the new District Engineer in charge of the Tulsa district, U. S. Engineer Corps. Col. Rindlaub, up until his promotion, was assistant chief of the Tulsa district. He is one of the best liked men in the Southwest Division. The Tulsa district is one of the best organized districts in the Southwest area. Many contractors working on projects in this district are high in their praise in the efficient way that the district is operated.

Maj. Don A. McKinnon, former Montana state highway engineer, reported for active duty with the U. S. army engineering corps. Major McKinnon, who headed the Montana highway department for six years, volunteered for army service several months ago. Since he left Montana last year Major McKinnon has directed construction operations on military projects at Parsons, Kan., and LaJunta, Colo.

Col. H. A. Montgomery, former District Engineer, has been transferred to Canada, in charge of a Division Office.

New List of American Standards

The American Standards Association, 29 West 39th St., New York, Oct. 16 announced the publication of its newest List of American Standards for 1942.

More than 550 American Standards are listed, of which 71 represent new and revised standards approved since the last (February 1942) issue of the list. These are marked with an asterisk.

There is a separate heading for American War Standards—standards developed specifically for the war effort.

Another section is devoted to American Safety Standards, which are also of great importance to the war effort in connection with the President's program for the conservation of manpower.



OSGOOD AIR CONTROL



the smooth, velvety, effortless control force that brings the operating ease and efficiency of steam to this new OSGOOD Type 70 crane. OSGOOD Air Control is simple in operation, easy to maintain, and costs next to nothing. Even though our production schedule is full—now is a good time to check on OSGOOD Air Control.



New Trade Literature

Mixing Materials for Road Purposes.—Rototiller, Inc., Troy, New York, has just issued a 6-page bulletin describing the machine which has given its name to the corporation, describing how it mixes cement or road oil in sand or soil for road bases, road surfaces, and stabilization. The folder is well illustrated to show the character of the equipment and the fundamental operations.

Two Publications on Oil Filters for Motors.—W.B.G. Oil Clarifier, Inc., Kingston, N. Y., publishes a handsome 16-page letter-size bulletin, entitled "Continuous Filtration of Oil," in which is a condensed history of oil filtration as applied to internal combustion engines, with notes on the manner in which filters work, reasons for filtering, chemical changes occurring, and the equipment used. Applications are shown to both motor truck and stationary engines. "The Need, Selection and Service of Modern Lubricating Oil Filters" is the title of a monograph by W. G. Burhans, President of W.G.B. Oil Clarifiers, which covers the subject carefully and in detail. Sub-headings following the introduction are—Problem of Acid Removal, Installation and Service, Typical General Installation Instructions, Proper Size, Pressure Drop, Initial Cartridge Life, Increased Cartridge Life, General Operation, Winter Operation, Dilution vs. Wear, Bench Filter Tests, The Selection of a Filter, and The Future of Filtration. The size is 8½x11 in., punched for standard 3-ring binder.

Lubricants Speed War Construction.—A handsome 12-page brochure just issued by Gulf Oil Corporation of Pittsburgh, Pa., describes briefly the part played by lubricants in the Nation's 20 billion dollar war construction program, and gives many vivid scenes on work where Gulf lubricants are used. The views range through munitions dumps, ordnance plants, firing ranges, airports, camps, mines, docks, hospitals, housing, flood control, sewage disposal, water supply, bridges and highways. Location, name of contractor and brief comment accompany each.

Stone, Gravel and Sand Equipment.—Bulletin No. 304 of Rogers Iron Works Co. of Joplin, Mo., is a hand-

some 36-page catalog of crushing, sizing, conveying, and storing equipment, in which each type of machine is clearly pictured in halftone, and treated with diagrams. The descriptions are brief and pithy, statistical matter being presented for the most part in the specification tables.

Portable Sanitary Drinking Fountains.—A four-page, letter-size folder illustrating and describing the Dobbins Portable Drinking Fountain has been issued by Dobbins Mfg. Company, Elkhart, Ind. The folder also describes the Dobbins Salt Tablet Dispenser for installation where men are working under high temperature conditions either outdoors or in.

Army Pontoons Made of Synthetic Rubber.—The Corps of Engineers, U. S. Army, now is ordering only pontoons or pneumatic floats made of synthetic rubber.

"Special Delivery"

We're moving fast these days, building cantonments, air bases, roads, plants, etc.—and it's important to do a good job in a hurry. The fast action of Hercules Speedraulic Hoists isn't something new, but it is something important when there is lots of material to be moved. With fast, powerful 6", 7", 8" and 10" Hercules Speedraulic Center Lift Hoists, it's "Special Delivery" of capacity loads, on time—every time.

HERCULES STEEL PRODUCTS CO.
GALION, OHIO

This Engineering Principle governs location of all welds on rolled steel frames of Byers excavators



For complete specifications and delivery of any of Byers $\frac{3}{6}$ - $\frac{1}{2}$ - $\frac{5}{6}$ - $\frac{3}{4}$ -yd. gas or diesel power shovels, cranes, draglines or back hoes on crawler or truck mountings, see the nearest Byers sales and service headquarters, or wire factory.

DISTRIBUTORS THROUGHOUT THE WORLD

Specify **BYERS**
CRANES and SHOVELS
RAVENNA, OHIO
DISTRIBUTORS THROUGHOUT THE WORLD

FREE WAR STAMPS

\$1.00 in WAR STAMPS for each acceptable helpful hint on:

"IDEAS FOR KEEPING MY DISTRIBUTOR ROLLING FOR THE DURATION"



What extra precautions are you taking during this emergency to lengthen the useful life of your bituminous distributor?

In wartime, all of us have to keep equipment operating longer, producing more. Consequently, we're looking for ideas to be incorporated in a new bulletin "Wartime Maintenance of Bituminous Distributors", which will be mailed to all interested contractors, regardless of the type of distributor they are operating. There's \$1.00 in War Stamps waiting for you for every acceptable hint you send in, provided you get it to us first. A post-card or handwritten letter will do—get it in the mail today!

ET NYRE
BLACK TOPPER
BITUMINOUS DISTRIBUTORS
E. D. ET NYRE & CO., OREGON, ILL., U.S.A.

New Equipment and Materials

New Product Increases Strength of Concrete

A new product which is claimed to make concrete more resistant to weather and abrasion by Dr. W. A. Gibbons, Director of Development,



Removing Hydron from the concrete

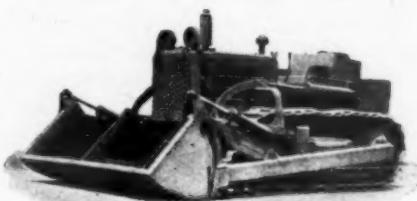
United States Rubber Co., Rockefeller Center, New York. The product is an absorptive lining for forms in which concrete is poured and is known as Hydron. By removing water and air bubbles from the surface of concrete, Hydron is stated to produce

a concrete that will last longer and will have a smoother and more pleasing finish without brushing or scraping. In one test, samples of concrete were held within two inches of an air blast delivering sharp steel grit at 20 lbs. air pressure, Dr. Gibbons stated. With concrete cast against ordinary wood forms the blast dug a hole $\frac{1}{4}$ in. deep in one minute. With concrete cast against Hydron the particles bounced off the case-hardened surface leaving a barely perceptible mark. In weathering tests where samples were repeatedly frozen and thawed, samples of concrete cast against Hydron withstood four times as many cycles as samples cast against wood. Hydron form linings consist of an absorptive material faced with a fabric. The linings are easily applied to the concrete forms by stapling.

Drott Bull Clam Shovel

An all-round utility machine that handles a wide variety of construction jobs, has been brought out by

the Hi-Way Service Corporation, 3841 W. Wisconsin Ave., Milwaukee, Wis. This machine, known as the Drott bull clam shovel, is available in various sizes. The bull clams are made to fit all makes and models of tractors and have heaped capacity ranges of 1 to 4 cu. yd. Their lifting capacities are 3,000 to 12,000 lb. Objects as materials may be carried as high as 3 ft. above ground. The drop below ground level is 1 ft. The clam is hydraulically controlled from the



Drott Bull Clam Shovel

driver's seat. In digging the depth of cut is regulated by the raising and lowering of the clam. Either end of the clam may be tilted independently to a 24 in. angle from the driver's seat while the tractor is in motion. The shovel is built close to the tractor and is perfectly balanced, running free of the tractor.

With the Manufacturers

Concrete Honor Roll for Men in the Service

To honor its men in the service, Universal Atlas Cement Co. has installed the world's only concrete honor roll. It is a precast architectural concrete slab, 3 ft. by 4 ft. by 1½ in. thick and is permanently embedded in a wall built of the same



Concrete slab honor roll

material. The colors for the red border, blue star and white field are made by exposing aggregates of those colors in a matrix of cement. No artificial color pigments are used. Ceramic aggregates are used for the blue star, vitrified glass for the red border and quartz for the white field. It was produced by John J. Earley, Washington, D. C.

Fiber and Detrick Appointed Field Representatives for Timken-Detroit Axle Co.

Guy Fiber of Detroit and L. E. Detrick of Chicago have been employed by The Timken-Detroit Axle Co. as field representatives to work with operators of motor vehicles, their mechanics and drivers, in improving maintenance practices and driving habits. Detrick, who will have headquarters at 2519 W. Winnemac Avenue, Chicago, Ill., will cover territory that includes Illinois, Wisconsin, Minnesota and Indiana. H. A. Mitchell was recently transferred from this territory to the west coast. Fiber will cover Michigan, Ohio, West

Virginia and parts of Pennsylvania, with headquarters at 22422 Six Mile Road, Detroit. Both Fiber and Detrick have had long experience in the automotive field. They will augment the large field force now conducting Timken's nationwide A. M. (Axe Maintenance) program, which includes the presentation of a sound-

slide-film in color at prearranged meetings for the benefit of the personnel of operator organizations.

Osgood Receives Army-Navy "E" Award

The Army-Navy "E" has been awarded to The Osgood Co., Marion, O., for its fine record in the production of war equipment. An interesting feature of the proceedings was that the award ceremony and programs were slanted directly at the employees. A souvenir program was



AMCRECO

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PILES and TIMBER

AMERICAN CREOSOTING COMPANY

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ADDRESS INQUIRIES TO CHICAGO, ILL., OR LOUISVILLE, KY.



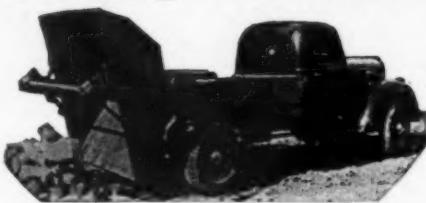
Mr. Check says:



JONES & LAUGHLIN STEEL CORPORATION
AMERICAN IRON AND STEEL WORKS
GILMORE WIRE ROPE DIVISION • PITTSBURGH & MUNICH, PA.

"J&L PERMASET
Pre-formed Wire Rope
gives extra service."

Ready for Winter?



Brooks LOAD LUGGER

Keep traffic lanes open throughout the winter season for the movement of vitally needed materials. You can do it with greater speed and economy when you use Brooks LOAD LUGGER mounted on a truck chassis.

For snow removal, hauling supplies, repairing streets, handling garbage and many other material moving jobs, you can save time and man-power with this modern loading-dumping unit.

Distribute the detachable buckets along the curb for the men to fill. Then pick up the loaded buckets to haul away and dump . . . the operation is controlled from the cab.

Write for Catalog No. 44



Use 5 to 10
one - piece
buckets to
each LOAD
LUGGER
for best
economy.

Distributors in all Principal Cities
511 Davenport Road

Brooks EQUIPMENT & MFG. CO.
KNOXVILLE, TENNESSEE

prepared, and a personalized and individually autographed copy by President M. C. McNeil, was presented to each employee just before the ceremony. On the inside of the cover page of the personalized programs an individual photograph of the recipient was mounted.

Plant Coordinator Appointed by Chicago Pneumatic Co.

Appointment of E. P. Barry, as Coordinator of Plants for the Chicago Pneumatic Tool Co., was announced

Oct. 26 by H. A. Jackson, President, at the Company's Head Office, 6 East 44th St., New York, N. Y. Mr. Barry, formerly of Glenn L. Martin Co. aircraft manufacturers at Baltimore, Md., will supervise machine equipment, tool designing and production methods for the four plants of the Company located at Detroit, Cleveland, Franklin, Pa., and Garfield, N. J. With over 25 years of experience in machine tool designing and production, Mr. Barry is well suited for the newly created position

J. R. Norton Appointed Distributor for Sauerman Bros.

Sauerman Bros., Inc., Chicago, Ill., manufacturers of long range material-handling machinery, announce the appointment of J. R. Norton, 11 W. 42nd Street, New York, N. Y., as distributor to succeed W. R. Elden who died recently. Mr. Norton is well known to the buyers of construction and mining machinery in the New York district, having maintained a sales office there for a number of years.

DIRT MOVING EQUIPMENT

Highway construction involves more dirt moving than any other branch of engineering construction. ROADS AND STREETS, the only national engineering construction magazine devoted exclusively to, and covering all sections of the highway field is the most effective and economical medium through which to sell dirt excavating, grading and hauling equipment.

Make Your Stationary Equipment **PORTABLE--** with EWC Mountings!

These strenuous days call for easy, flexible portability of all types of machinery. Just tell us the size and weight of the unit, and the likely speed and road conditions. Our years of engineering experience will assure you of sound, practical aid in developing an efficient mounting—wheels, axles, tongue, springs, etc.



EWC WHEELS

ELECTRIC WHEEL CO.
DEPT. RS, QUINTON, ILL.

Cleveland Rock Drill & Pneumatic Tool Representative to Make Extensive Trip Through Latin America

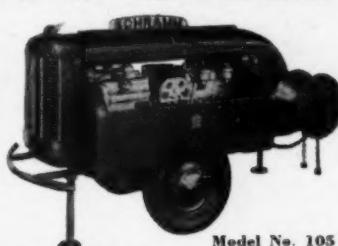
Robert Craig, until recently District Manager for The Cleveland Rock Drill Co. and The Cleveland Pneumatic Tool Co. at Salt Lake City, Utah, has been designated by his principals to make a trip through South and Central America, contacting distributors and generally looking after the interests of these affiliated concerns. Mr. Craig expects to make his first stop at San Juan, Puerto Rico, about mid-November, proceeding then to Port of Spain, Trinidad. He will also visit Santiago, Chile; La Paz, Bolivia; Guayaquil, Ecuador; and Medelin, Colombia, then calling at Panama City and Colon. Mr. Craig has been stationed twice previously in Western South America and is capable of carrying on in the best traditions of the country's commercial relations with our Latin American neighbors.

Caterpillar Tractor Co. Sponsors Engineer Corps Heavy Shop Company

Caterpillar Tractor Co., Peoria, Ill., has sponsored a Corps of Engineers Heavy Shop Company, composed chiefly of skilled "Caterpillar" men from the Peoria plant, and that the Shop Company is now in training for active service. In command of the Shop Company is Captain Jean

Walker, formerly export representative for "Caterpillar." "Caterpillar" was the first equipment manufacturer to respond to the call of the Engineers for an organization comprised of skilled man power to keep the machinery of the Engineers rolling. The Company consists of 199 officers and men, most of whom will become non-commissioned officers or technicians. The Shop Company volunteers left Peoria in a body with appropriate farewell ceremonies, witnessed in the heart of the city by thousands of persons who gathered to pay tribute. Included among the

IT'S MODERN



PORTABLE—LIGHTWEIGHT—COMPACT
Built in sizes 20 to 420 cu. ft.
actual air delivered.
Write for Catalog 42-P

SCHRAMM, INC. WEST CHESTER PENNSYLVANIA

MULTIFOOTE CONCRETE PAVERS

Single drum 27-E and 34-E models.
Also tower and inclined boom
pavers. Catalogs on request.

ADNUN

BLACK TOP PAVERS
For Black Top paving and rock
spreading. Only machine with
continuous course correction.
Ask for Catalog.

THE FOOTE COMPANY, INC.
Nunda • New York

speakers were Col. M. M. Dawson, Chief, Requirements, Storage and Issue Branch Supply Division, Corps of Engineers, Washington, D. C., and L. B. Neumiller, President of "Caterpillar."



Members of Shop Company prepare to leave for actual training



SALVAGE THOSE CAR TRACKS

THE RAPID PAVEMENT BREAKER is unequalled in performance for breaking out car tracks.

Also used for demolition of—
Roads • Bridge Decks • Foundations • Tamping • Breaking Frozen Ground.

CONCRETE CUTTING CORP.
of AMERICA

607 DeGraw Street
Brooklyn, N. Y.

Dig, Haul, Dump



in one operation

On jobs where materials are to be moved distances of several hundred feet or more, a SAUERMAN Drag Scraper or Cableway is a great money-saver because it will dig, haul and place the materials without the help of other equipment.

First cost of a SAUERMAN machine is reasonable, maintenance expense is small, and the simplicity of operation permits easy one-man control of even the largest installation.

This equipment is very flexible and is readily adapted to meet new and difficult working conditions. Sizes range from small portable units designed for cheap handling of a small hourly tonnage of loose materials up to powerful machines that will move as much as 1,000 tons per hour of the toughest materials.

Write for our catalog and see for yourself how others have cut costs on hundreds of dig-and-haul jobs with SAUERMAN Machines.

SAUERMAN BROS., Inc.
588 S. Clinton St. Chicago

Canadian-Fairbanks-Morse Now All-Dominion Distributor for P&H Welders and Electrodes

Already in effect, as result of a recent agreement, all Canadian distribution of P&H welders and electrodes, manufactured by the Harnischfeger Corporation, Milwaukee, Wis., will be handled exclusively by The Canadian-Fairbanks-Morse Company, Limited. The facilities of Canadian-Fairbanks-Morse are ideally adapted to this new set-up. The company maintains branch offices and warehouses in all important cities of Canada, all of which are well staffed with capable engineers and service men to insure proper application and satisfactory operation of the equipment it sells. Main offices are at 980 St. Antoine Street, Montreal.

In addition to being a Canadian outlet for all products manufactured by the Fairbanks-Morse Company in the U. S., Canadian-Fairbanks-Morse also handles a complete line of machine tool equipment, automotive equipment and accessories, and home appliances. It operates a factory in Sherbrooke, Que., where scales, valves, oil burners, stoves and boilers are manufactured, and where also a good deal of general foundry work is done.

Antiquated Rollers Helping War Effort

The first motor roller made in America, a 1-cylinder relic of earlier road building days, was recently sacrificed to the war scrap drive. Though it was cherished by the original builders for sentimental reasons, they felt its 20,000 lbs. of critical material would serve a more useful purpose by aiding the war effort now. After the machine had worked for the original owners a great many years, arrangements were concluded to place it on display near the entrance of The

VULCAN PAVEMENT AND CLAY DIGGING TOOLS

ARE MADE in a complete line of sizes to fit all standard compressed air hammers.

Send for NEW Vulcan illustrated CATALOG today.

VULCAN TOOLS—THE WORLD OVER—
NOTED FOR QUALITY AND DURABILITY

VULCAN TOOL MFG. CO.
QUINCY, MASS.

THAW CULVERTS AND HYDRANTS WITH AN AEROIL



No. 98 Portable Steam Thawer

A handy steam plant with a detachable thawing torch. Used by leading Highway Departments for Culvert Thawing. Special Culvert Nozzle (10 ft.) available. Send for WINTER CATALOG No. 2345 including Concrete Heaters, Portable Coil Water Heaters, Thawing Torches, Ground Thawers, Samanders, Tar and Asphalt Heaters, etc.

1917-1942—25 YEARS OF SERVICE

AEROIL BURNER CO., INC.
571 PARK AVE. WEST NEW YORK, N. J.
Branches: Chicago, San Francisco, Dallas

RELIANCE

CRUSHING, SCREENING and WASHING UNITS

• Up to 2000 Tons a Day •

| | | |
|------------|-------------|----------------|
| Crushers | Bins | Drag-Lines |
| Excavators | Pulverizers | "GAYCO" |
| Sweepers | Feeders | Centrifugal |
| Screws | Spreaders | Air Separators |
| Wash Boxes | Kettles | Conveyors |

UNIVERSAL ROAD MACHINERY CO.
Kingston, N. Y.

Canadian Representatives: F. H. Hopkins & Co., Ltd.
340 Canada Cement Co., Montreal, Que., Can.

HOTEL PHILADELPHIAN FORMERLY HOTEL PENNSYLVANIA

DANIEL CRAWFORD, JR., Mgr.
39th and CHESTNUT STREETS
PHILADELPHIA, PENNSYLVANIA

Our courteous and competent staff will give you the utmost in friendliness, comfort and service. Conveniently located to all stations, and only five minutes away from the heart of the business section.

600 ROOMS
Each with bath from \$3.00 up

RADIOS IN EVERY ROOM

Lounges and Restaurants

Unrestricted Parking to 8 a.m.

NEED A BIG TRAILER?

La Crosse Makes Them
Up To 200 Ton Capacity—
★ WRITE OR WIRE ★

LA CROSSE TRAILER & EQUIP. CO.
LA CROSSE, WISCONSIN U. S. A.

Austin-Western Road Machinery Co.'s general offices. Here it rested on a heavy foundation pedestal and was suitably marked with a bronze plaque, for the benefit and interest of guests and visitors. Records of old literature dealing with the antiquated machine furnish some very fascinating descriptions. One points out that it can do the job more easily, efficiently and economically and less objectionably without smoke, steam, sparks or soot blowing about. Without the expense of teams and men to furnish water and haul coal, without loss of time raising steam and without risk of boiler explosion. Another explains how it has power to operate a crusher or other machine, pointing out that since automobiles are becoming so popular, the gasoline engine is well understood by most everybody. Two other rollers on display were also salvaged for scrap. One resembled the old style bicycle with its high front wheel of a half century ago and another a 10-ton job brought over from Ireland for experimental purposes. The entire proceeds from the sale of the rollers was donated to the local war fund.



McClure Kelley, president of The Austin-Western Road Machinery Co., hands Dr. T. P. Stephens, chairman of Aurora, Illinois, War Fund, a check from scrap metal sale of historic rollers, while C. W. Sencenbaugh, chairman of the company board (extreme right) and L. C. Reed of Inland Steel (extreme left) look on

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CANTON, OHIO

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